How Good Are the Russians? Bonner's Smog Hog for RC!

MODEL AIRPLANE NEWS

FEBRUARY 1967 35 CENTS

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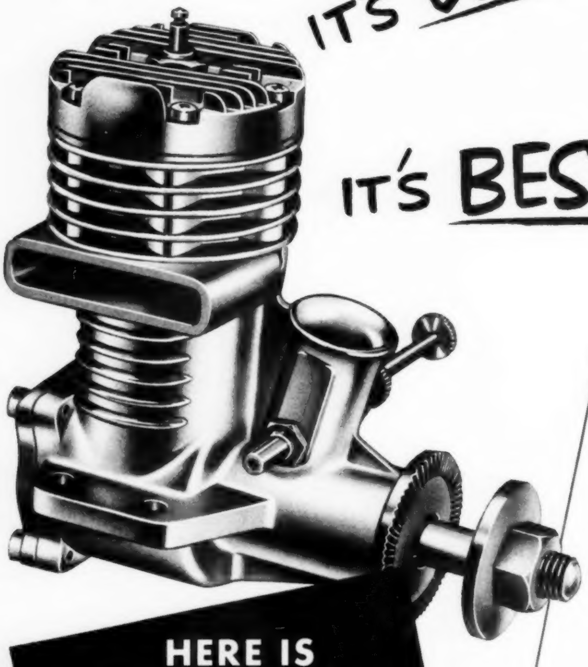

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Contest Calendar

Enter or visit these meets.

JANUARY

20—*Phoenix, Ariz,*: Record Trials for OR, FFG, OHLG, TLG, CLE and CL. Quentin T. Webster, CD., 521 E. Camelback Rd., Phoenix, Ariz.

FEBRUARY

3—*Green Bay, Wisc.*: Class AA Third Annual Winter Jamboree for FFG, TLG and RC. R. L. Cowles, C.D., 224 Oakhill Drive, Green Bay, Wisc.

24—*Phoenix, Ariz.*: Class AAA 7th Annual Southwestern Regional Model Airplane Contest for FFG, CL, OR, TLG, OHLG, CLS, CLC, CLFS and RC. Quentin T. Webster, C.D., 521 E. Camelback Rd., Phoenix, Ariz.

INTERNATIONAL COMPETITION NEWS

► This magazine has been kind enough to provide space every month so that the many FAI modelers may get the latest accurate information regarding events for the coming season. To put everyone at ease, there will be no rule changes for the 1957 elimination system. Rules that applied in 1956 will still be in effect. Dates for 1957 team selections by elimination will be made—Local eliminations, May 25-26th, 1957; Semi-finals, June 15-16, 1957. These dates will apply for the entire country.

The December 1956 FAI meeting in Europe was to decide many important items, including any rule and specification changes, finals dates and sites, and the problem of combining finals events. Reports on this meeting will be made public as soon as they become known.

By sampling opinions of the semi-finals entrants last spring, it was evident that the majority would prefer to hold elims during the months when weather is generally better. The advantages of selecting teams well in advance are numerous. To accomplish this end, the Committee has evolved a major change in the eliminations system. The changes will take place after the picking by elimination of the U.S.A. 1957 International Teams. In effect, this means that there will be two series of elims this coming season. The eliminations to pick the 1958 teams will be as follows: 1958 Local elims, August 24-25; 1958 Semi-finals, September 28-29.

Rules and specs for the August and September meet may not be the same as the earlier meets. This goes back to the FAI model in the May and June contests, would decide any rule changes.

To sum up: You can fly your last year's FAI model in the May and June contests, but chances are you will have to build new models to meet the specs for the August and September meets. All 1957 team members will automatically by-pass the August meet and be eligible to compete in semi-finals.

Questions, ideas, nad queries for information will be welcomed. Write to Ed Dolby, 25 Exchange St., Rockland, Mass.

ED DOLBY
ACADEMY OF MODEL AERONAUTICS
International Competition Committee

27th Year of Publication

MODEL AIRPLANE NEWS

JAY P. CLEVELAND, President and Publisher

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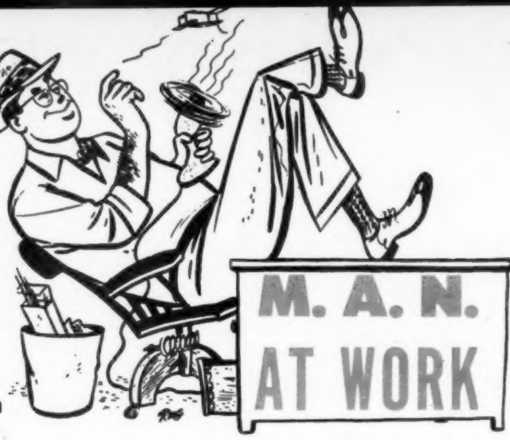

by
William
Winter

► More than one manufacturer of plastic model airplane kits is moaning about the supposed lack of interest of American youth in building and flying model airplanes. Plastic models are sold by the millions, along with other toys, through many hundreds of jobbers and distributors. It takes as many as 300,000 sales to break even. The "flying" model, in the viewpoint of people who make the plastics, is something you have to build and people won't build anything. (It sez here.) It is argued that boys must be interested in scale and not flying—but forgotten are the words, flying scale, which always has been the greatest interest of magazine readers.

There is, in fact, little doubt that plastic models have supplanted the old-fashioned solid and other mass produced quickie glue-and-stick models, many of which were doomed anyway. Some solids were good, and so were some cheap fliers. But too many were stinkers, and that is no way to run a railroad. In the day of the cheap flier, the then biggest manufacturer told us that 93% of its products were never completed. Nobody's fault, that's just the way it was. It boiled down to millions of kids wanting to make airplanes and the industry as a whole never being able to solve the riddle of how to design and kit an airplane that could be put together, and then have it fly. You can put a plastic model together—no one can deny it.

Even at its best, the built-up model can never be sold on the scale that plastics are sold. Too many "burned" merchandise buyers remember sad experiences with old-fashioned kits. Hobby jobbers push along the line of least resistance. It doesn't make a difference to the average dealer as long as the item sells. A built-up model of a jet, with flimsy bulkheads and scrawny stringers is rough on junior who never before saw a model airplane but the same jet in plastics can be at least stuck together into a recognizable object.

It is sad indeed that any manufacturer could believe that people won't build model airplanes. The news must perplex other manufacturers who make wood kits, gas engines, accessories, to the suppliers of wood and cement like Testor, and so on. It is also news to MAN. More kids than ever, and at a lower age level than ever, want to build models. They want plans, ask (*Continued on page* 7)

NEXT MONTH'S COVER
CURTISS NAVY RACER

PLANE ON COVER

For a change of pace, and a respite for airplane artist Jo Kotula, this February cover is a color photograph of a model airplane. It is the latest thing in radio-controlled jobs, a biplane by Ray Downs. Light wing loading for better stunting is behind the idea.


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MAN at Work

(*Continued from page 4*)

questions by the thousands. The demand for information is crushing. For those manufacturers who grew to the stage where they could compete in the toy field, we are happy. But, having defaulted the model airplane field is no justification for off-base assumptions that kids don't like to build and fly model planes. Maybe the trade, or some segments of it, has lost its way, or lost the answers, but any statement that airminded American youth isn't interested in building flying models, to put it mildly, is confusing as a dead booster battery. The same voices will tell you that we should have modeling in the schools. If it doesn't exist, how can we have it? Impressive argument.

• • •

► Plans for the ME-109 Stunter, November 1956, should have said that the left, inside wing is 1⅜ inches longer than the right, for a total span of 48 and not 49⅜ inches . . . Interesting pix, stunt jobs and builders, from the Prop Jockeys, Vero Beach, Fla. If you live thereabouts, contact Dennis Wood, Woody's Hobby Horse, 1606 24th Ave., Club papers everywhere are still giving Nats blow-by-blow reports. The Flite Master, Lakewood, Ohio, had some tidbits: After a jet crack-up, Johnnie Smith quoted words of wisdom from Texan, Dale Kirn—in the Texas winds you need great big tails. And, re the rules, Smith figures you almost have to fly multi-engine to win in scale. That winning B-36 had six Torp .19's, four Jetex Scorpions, and got 150 points for engine detail alone. Combat was hairy, said Smith, what with pressure tanks, hot engines, and 100 mph plus speeds. Better check up on trends in combat engines.

• • •

"I take exception to your statement 'why penalize a Cub for being good, or a guy for building one' in your comments on the proposed rules changes for flying scale free flight, MAN, Dec., 1956," tees off Bob Evans, Inglewood Flightmasters, but speaking for himself. "Our 1956 rules were initiated to preclude the tremendous advantage gained by merely building a high-wing monoplane, to stimulate 'contest fever' in the fly for fun boys, and to attract a greater variety of planes." The club's last meet was a hit with contestants and spectators alike. First went to Bob Hill with his neat Buhl Pup. Maybe you are right Bob, but it sure looks like Hill and his Bull pup should be handicapped down to the level of the P-40 et al. . .

• • •

► Sig Manufacturing, who cuts some of the wood used by modelers who do so make airplanes, already has outgrown a year-old building and plans an addition this coming summer to double the floor space.

"In spite of the constant moaning about over-simplified kits, ready-to-flys, plastics, etc.," remarks proprietor Glen Sigafoose, "I believe there is more serious model building today than ever before, and I've built models since 1929. We owe a lot of our success to the plans you publish. Many retails sales are for balsa to build these planes."

• • •

► Speaking of the Nats, 1957 we mean, it's to be Willow Grove, Pa., July 29 through August 2. More than 400 trophies and awards. So you'll have one chance in three to win an award. Sounds like television . . . Stewart Lundahl has a new spray gun at the hobby shops. Works off a vacuum cleaner or other air supply, any type of paint, lacquer, dope, etc. Called the 410M Hobby Spray Gun . . . And have you seen the Jetco Sabre Stunt? This is definitely one of the best—let's say there is none better. The Jetco firm is operated by Christine and Albin Zaic, with an assist from Bill Dean, he of the nifty plans, on over-all kit design and plans. Designed and built by Jose Sadurni, Mexico, the model took second at the 1955 California Nats. Mexican models in general are works of art and Sadurni's was considered the best looker in stunt at the big meet that year. It's a big job, 50 inches span, for .19 to .35's. To judge by the plans and the many detail sketches, the structural engineering that went into the kit, must have required months of skull-cracking work. This Sabre is a stand-out job.

• • •

► Should the U.S. send teams, or models to be proxy flown, to all international events? The reason for the disastrous and disgraceful showing in speed at Florence, Italy, has been blamed on the lack of top-notch supplies at the bases where the AMA members in the armed services in Europe were stationed. Much has been said about the lack of support, money that is, to transport our teams to the various final sites. Heck, we can't even find supplies for our representatives! If the supply situation was so bad that only one official flight was turned in, a 92 mph for a 28th place, we certainly had no right cluttering up the premises at Florence. Doubt that any other country in the world would have managed so poorly. Nor does this column believe that the Italian proxy fliers could be the sole blame ("lack of familiarity") for the tail-end performance in Nordic. Given half a chance, proxy fliers at these events have proved themselves well skilled and there is nothing mysterious (to put it kindly) about the Nordics we build. MAN at Work would welcome a frank criticism from the Italians. There's something rotten in Denmark—or in Florence.

• • •

► Flying sites come and go and you never know where you'll find one. Last summer the Republic Aviation Model Society, the RAMS, that is, ran two very successful contests at Mitchell Air Force Base, on Long Island. So Art Wardell, who believes you cannot shoot a man for trying, asked the Commanding Officer to set aside an area for controlline flying. To quote Art, ". . . was completely overwhelmed when . . . gave unqualified approval, assigned an officer to handle the details and asked that I set up necessary rules of conduct along with a complete list of clubs interested in using the area and a schedule of flying hours." Now the RAMS ask that all interested parties contact Wardell, the RAMS, in care of Republic Aviation, Farmingdale, L.I. . . . direct approach pays off, as another New York area incident proves. Energetic gent, name of Jack Siegel, wrote Mayor Wagner, explaining the lack of flying sites, how modeling combats delinquency, etc. Mayor Wagner obviously does not own the traditional open-top filing cabinet, because he contacted the Executive Officer of the Park Department who wrote Siegel as follows: "A new area has been designated as of this Saturday, December 1, in the Bronx . . . can be reached by IRT subway, Pelham Bay Station . . . it is north of the Huntington Estate and Kane Parking Field." The rest seems to be up to the modeler . . . Vision, a $5 book, authored by Boeing's Harold Mansfield, published by Duell, Sloan and Pearce, 124 East 30 Street, N.Y.C., is an intimate, colorful history of the company, its many airplanes from WW 1 to this day, and a valuable insight into early American aviation.

Budapest, in 1956, was site of the Internationals, attended by this Russian team competing in Nordic, Wakefield; FAI Speed, Free Flight.

how Good are the Russians?

by P. G. F. CHINN

In 1956 Russia competed against the West for first time. And here, for the first time, is the low-down on Soviet modeling and design trends. It's a serious "hobby."

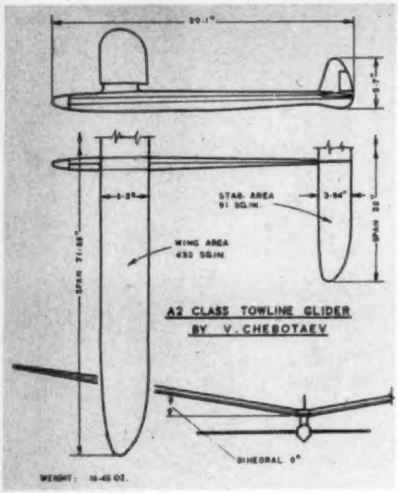
Fifth place 1956 Wakefield to Russia's Smirnov. Model resembled Western jobs more closely than other Soviet Ships. Model Aircraft pic.

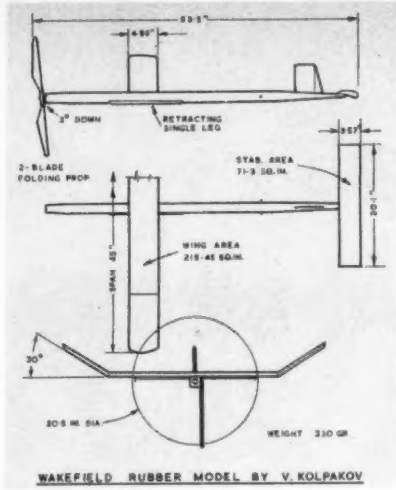
Three Russians, of a four-man team, placed in first nine in last Wakefield. Model Aircraft (London) picture shows Smirnov winding.

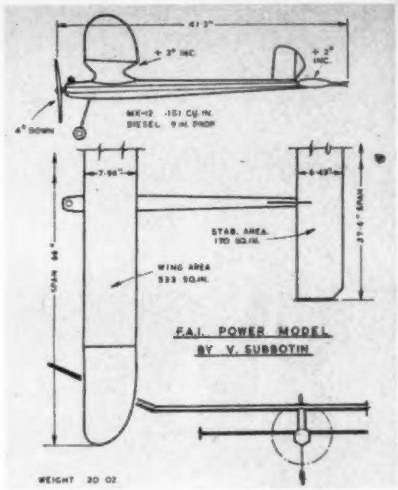
► The scene: the 1956 Wakefield International Contest at Hoganas, Sweden, where eighteen nations have just competed for the World Championship. The individual winner: a Swede, followed by an American, with a Briton and a Dane tying for third place. In the fifth place, out of fifty-eight contestants: a Russian. But, more impressive, three Russians, of the four-man team, are among the first nine place winners.

And so, competing with the West for the first time in an international model airplane contest, the Sovet Union becomes runner-up to Sweden for the Team Championship, narrowly beating Great Britain and the United States into third and fourth places respectively.

The high placing of the Russians was probably a surprise to some people, but not necessarily to anyone who remembers the past three seasons' Soviet Internationals, as reported in our Foreign Notes column. These meetings, held in Russia in 1954, Czechoslovakia in 1955 and Hungary in 1956, have clearly indicated the high standards of modeling that exists among (*Continued on next page*)





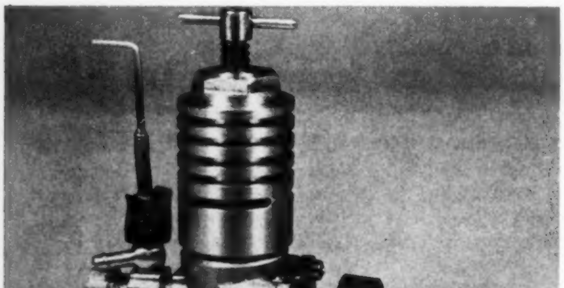


Leading Russian rubber exponent, Vladimir Matvejev. Built largely from reed, models take months to construct. Pic by Model Aircraft.

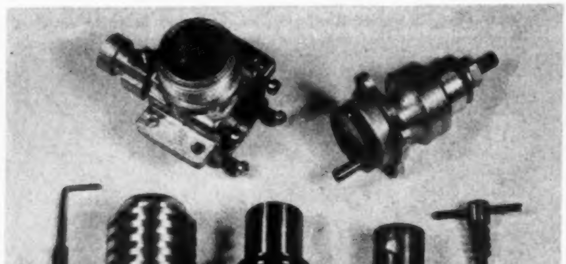
the experts in these Communist countries and, in particular, the strength of the Russian Wakefield flyers. This is underlined by the fact that the leading Russian Wakefield flyer, Vladimir Matvejev, sole representative of Russia in these three contests, placed 2nd. in 1954, 1st. in 1955 and 2nd. in 1956. That he is no exception, however, was proved when his three compatriots, Smirnov, Ivannikov and Kolpakov, placed fifth, eighth and ninth, ahead of Matvejev, in Sweden.

It is well-known that the Soviet Union holds a large number of official model airplane records. Even under the newly revised schedule of International classes, ten records, including three absolute world records, are held by Russia at this writing. Many of these records are for distance and height, categories which Western modelers seldom bother about, due to the practical difficulties attending the recording of such flights. Russia, however, regards these records as being sufficiently important to warrant official assistance by the provision of full-size aircraft for the necessary escort and chasing duties.

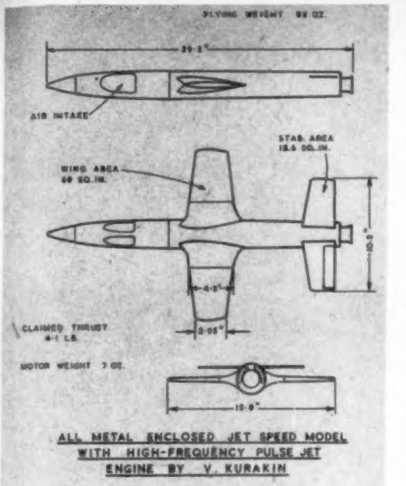
Here, in fact, we do begin to see the essential differences between East and West in modeling matters. In the United States, Britain, Germany, for example, the modeling movement is a hobby, supporting a commercialized industry which, in return, provides a vast selection of high-quality, low-priced model equipment and materials that can be purchased over the counter by anyone. It gets

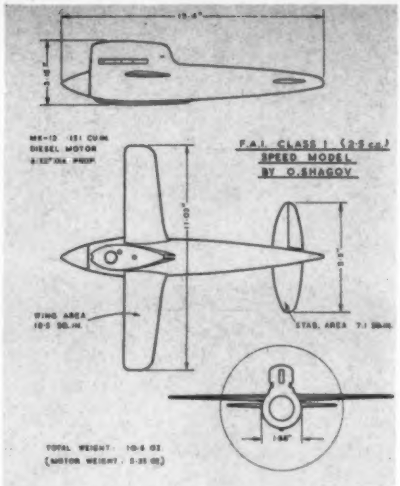


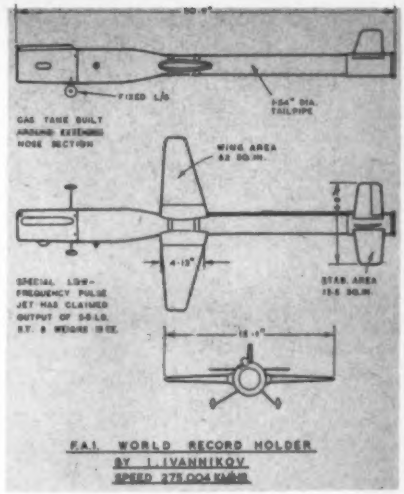
Standard FAI class motor, by MK-12 Diesel, designed by Gajevsky. It lacked "steam" when tested against western types at higher rpm's.



Parts of the MK-12. Engine features twin ball-bearings and rear disk valve, but does not have precision and finish of some motors.







no support from State sources and asks for none.

In Russia, things are different. There is virtually no model industry as we know it. The movement is in the hands of officially sponsored modeling "institutes." Here, the youngsters are trained in the rudiments of model aircraft construction, progressing, by stages, to more advanced models. Later, they may have the privilege of representing their locality in national contests and eventually, perhaps, of flying for the U.S.S.R. in an international event. When this occurs, they will wear the dark jersey and slacks uniform of the Soviet "sportsman" or "sportswoman," with the Russian characters "CCCP" (SSSR) in large white letters across the chest—a get-up which is becoming increasingly familiar at international athletics events throughout the world.

For events of this nature, the Russians spare no expense. When contestants from the satellite countries were invited to Moscow for the 1954 Soviet Internationals, everything was done, not only to make the contest itself a success, but also to favorably impress the visitors with the Soviet way of life.

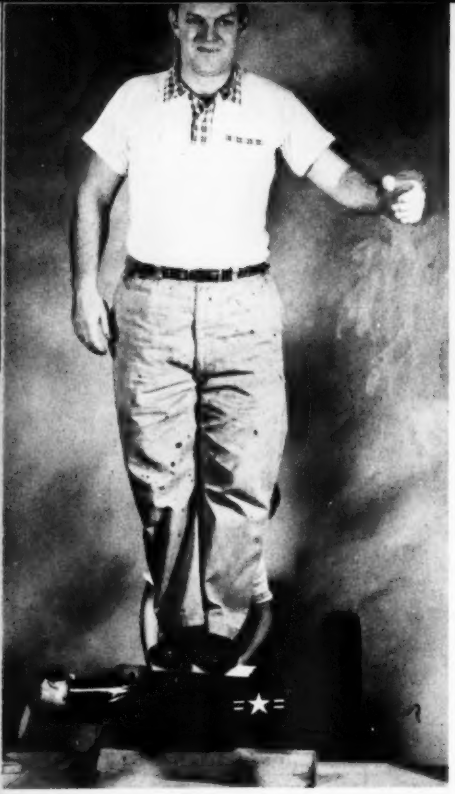
Thus, on arrival in Russian IL-12 transports at Moscow 3-4 days before the actual contest, parties were first taken on a tour of the city and shown some of the brighter aspects of Soviet achievement, the 800-ft high university building, the 100-yard wide city streets, then driven to their "lodgings"—some sort of castle of Czarist days and now a rest-center for "workers." Here, we are reliably informed, the feast laid before them was of such gigantic proportions that, when time came to hit the hay, the stairs were navigated on all fours.

At the contest site on Tushino Airport, contestants were provided with field repair boxes, "pits" where engines could be tested, plus the services of a team of Russian experts who, quote, "helped and advised the foreigners in a comradeful manner." The organization of the contest, we were told, was excellent. No models were lost: if a model passed out of the airfield, a Very light was fired and a Yak 18 two-place trainer, or a helicopter, at once took off and pursued it to its landing point.

The remarkable thing about the annual Soviet Internationals is that all these preparations are for the benefit of 35-40 contestants who, between them, return no more than a maximum of 120 flights in all the free-flight categories and somewhere between 20 and 30 flights in the control-line classes. Yet, at Moscow, a whole week was occupied in running off these events and the complete program, including process- *(Continued on page 38)*

Kolpakov winds last few turns on his 9th place Wakefield. Model had long fuselage, parasol wing, complicated geodetic frame. MA photo.

World's fastest model airplane (FAI Official) and the builder, Ivan Ivannikov, who took an 8th in Wakefield. Jet job turned 170.8 mph.



Can you do this to your model? Better than a wood job, author's Grumman Guardian "solid."

Looks the same but what a difference! Styrofoam blocks are carved and sanded easily.

Guardian in Styrofoam

by GEORGE MOIR

It would be a crime to let pass unnoticed this revolutionary new way to build an airplane stronger, lighter, faster. Check supply sources at the end of the article.

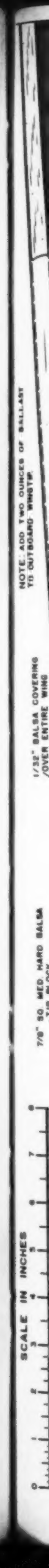
► Navy Carrier Event planes have come into their own. In the 1956 Mirror Meet, there were 64 such entries. With the wonderful help of the Navy, this event has become popular for both contestants and spectators. It taxes the skill of the pilot and is a challenge to the builder.

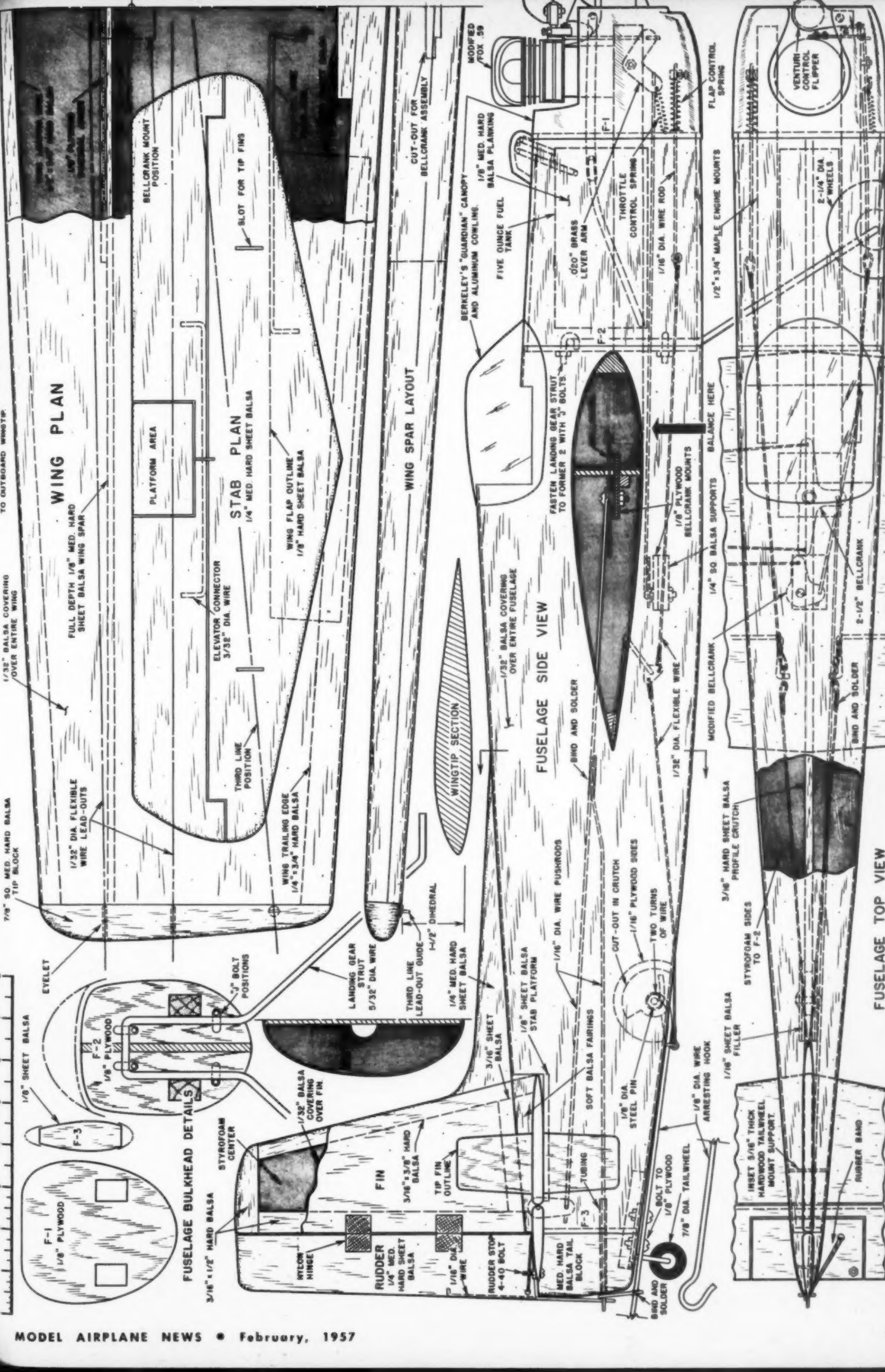
With the builder's problems in mind, our Guardian was designed to use Styrofoam as the main structural material. Styrofoam construction is much easier, lighter, and stronger than the conventional method of making up formers, wing ribs, plus heavy planking, etc.

This model has automatic flaps that fold up in place when the arrester hook makes contact with the arrester rope. This eliminates nicked flaps; also, the rudder goes into hard-right position when the hook is lowered. This helps to keep plane taut on lines during slow-speed flight. The motor control is on a third line and can be worked independently, which means the plane can be slowed down before dropping the hook and flaps.

There are no wing ribs in the main wing, only the main spar, leading and trailing edges, with a 1/32 balsa sheeting covering the Styrofoam. The fuselage has only (*Continued on page* 45)

And here, the Styrofoam has been attached to the wing spar, edges, and shaped. Side blocks will cement to the keel, fin, same way.





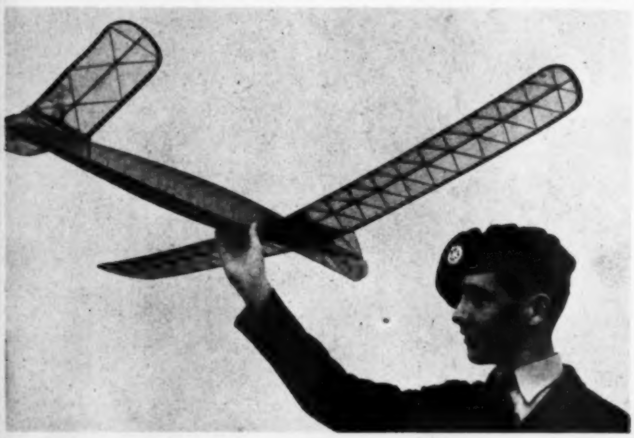
FULL SIZE PLANS AVAILABLE. SEE PAGE 56.

Flight line at recent Northwest Championships, Seattle, included Constellation with four Half A's, Douglas mail plane, Jap Zero.

AIR WAYS

Hard to believe that these beautiful reader-built craft were created by people who were once beginners. Really dream crates.

Outstanding geodetic glider bettered 20 minutes at recent British RAF contest. Clever canard, or tail-firster, designed by G. Caple.

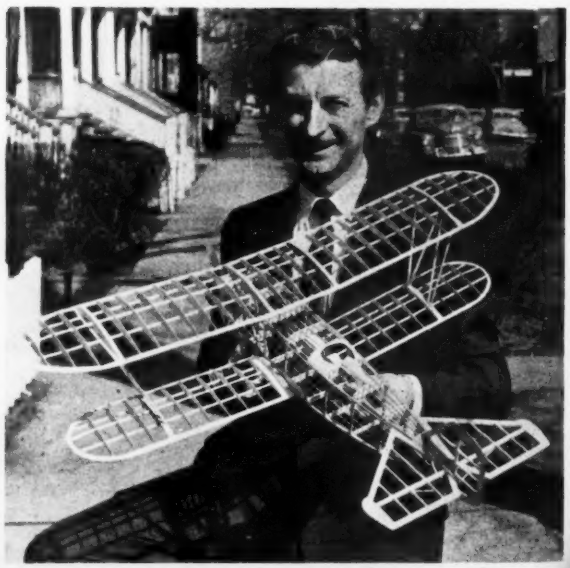


FOR nearly 30 years now, Air Ways has been the traditional title under which MAN has presented pictures of model planes made by its readers. Easy-going features like this too frequently get squeezed out by the serious business of building and keeping up with the mob. So, let's just enjoy these nifty planes.

When helicopter designer Igor Bensen wanted to test design he made compressed-air power model. Has remote stick control, maneuvers.

Hard to say whether Robert Haack, San Antonio, is a better modeler than he is a photographer. Sterling pic of a wonderful F4B-4.

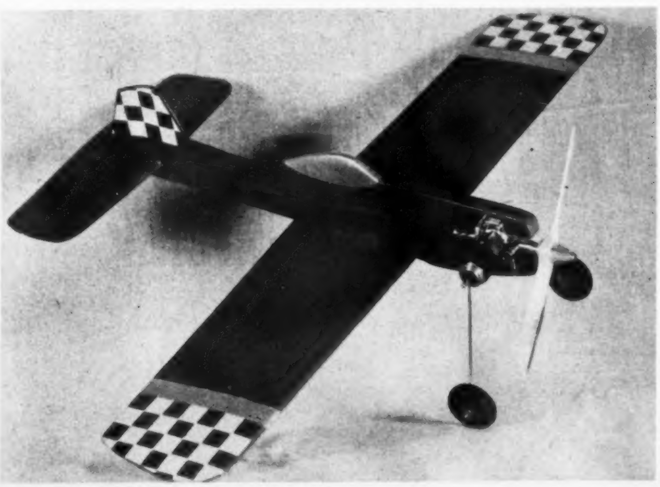
Many years a well known scale fan, Bill Gough, Chicago, made this 33 in. Boeing 95 mail plane. Weighs 6 ozs. and flies on Cub .035.



Hot trio of stunt ships from MAN plans, by Ward Trulock and his dad, from Odessa, Texas. Shown are Nobody, Half Fast, Palmer's Mars.

Keen looking Nieuport 28, WW 1 fighter, a tribute to building skill of Carl Miller, Nashville (Tenn.) Hobby Shop. He builds them all.

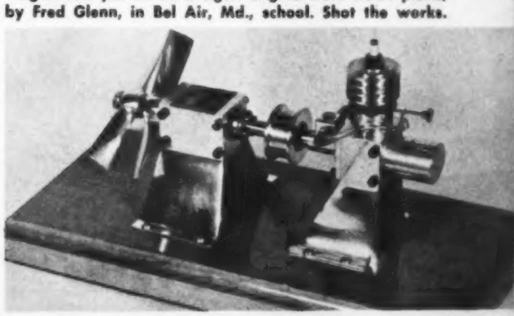
Third model he built and the first to fly, was this Scorpion, MAN Oct. 1955, by Bill Hudson, Norfolk, Va. Cub .049B, 25 ft. lines.



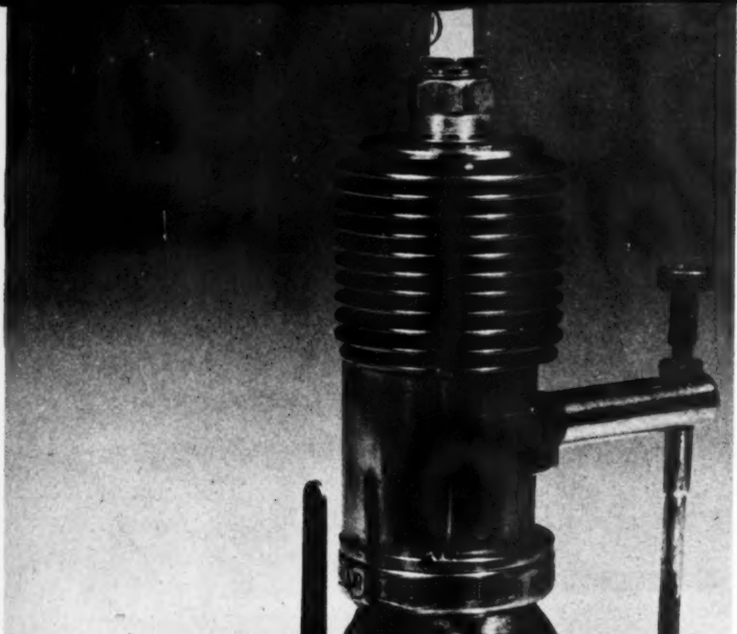
Be prepared, says Richard Paul, Brooklyn, N.Y., posing his .06, .09, and .15 Space Tigers. Functional craft.

Most authentic model in many a moon, a super-detailed Nieuport 11, by G. William Johnson of Jamestown, N.Y.

Magnificent job on Lil Dragon engine from MAN plans, by Fred Glenn, in Bel Air, Md., school. Shot the works.



Bill Brown's Brainchild



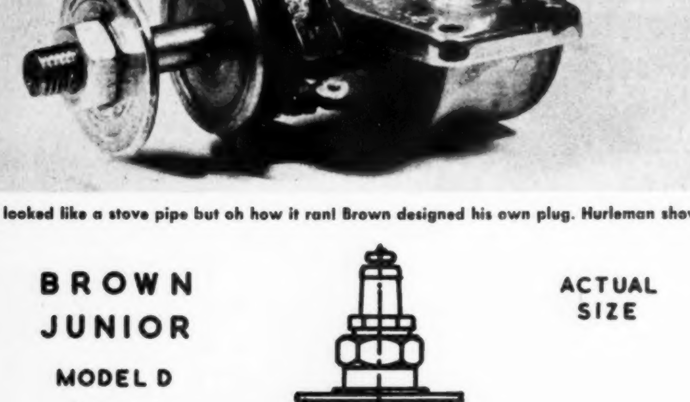
It looked like a stove pipe but oh how it ran! Brown designed his own plug. Hurleman shown.

BROWN JUNIOR

MODEL D

(1938)

ACTUAL SIZE



by P. G. F. CHINN

The "original" gas engine, of 20 years ago, put powered models on the map. In a way, the Brown was as famous as Henry Ford's flivver.

► The Brown Junior engine, famed in pre-war years, can justly claim to be the "original" model airplane engine.

During 1932 and 1933 a Philadelphia model builder, Maxwell Bassett, entered several model contests, using a large model powered by a miniature gasoline engine built by William Brown of the same city. At this time, of course, the form of motive power especially employed for duration models was the strip rubber motor and so decisively did Bassett's model demonstrate its superiority over rubber powered models, winning the Stout, Mulvihill and Moffett trophies at the 1933 Nationals, that a separate class for engine driven models was forthwith introduced.

In 1934, the Brown Junior engine was established as the first miniature internal-combustion engine for models to be offered for general sale to the public. The company formed for its manufacture was called the Junior Motors Corporation and in the next five years about 50,000 Brown engines were made.

Basically, the Brown Jr. remained unaltered through its many years of production. Even in 1938-39, when other manufacturers were advertising more modern designs, the standard Brown layout was maintained. The Brown had a reputation for quality and reliability and this was, no doubt, responsible for the continued preference shown for it

by a large number of modelers.

The Brown Junior was, of course, a spark ignition two-cycle motor running on a mixture of ordinary gasoline and #70 motor oil; had a cylinder bore of ⅞ in. and a stroke of 1 in., giving a displacement of .601 cu. in. For its size it was extremely light, the complete engine, less fuel tank and ignition coil, weighing only 7½ oz.

The whole design was essentially a simple one. A diecast aluminum-silicon crankcase with bronze bushed main bearing was used. Two screw threads only (cylinder to crankcase, and crankcase rear cover) served to unite the complete engine. An all-steel cylinder was employed with integral head and cooling fins and brazed-on bypass passage and induction pipe. The ignition-timer was of an effective, but simple, design and featured an eccentric bush type mounting to facilitate adjustment of the points gap.

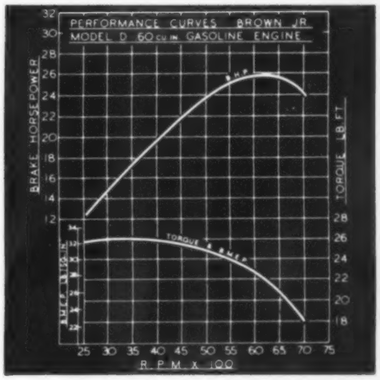
The original production model Brown Junior had a lapped alloy-steel piston and later became known as the Model B. Its selling price of $21.50 remained unchanged throughout the period of its manufacture, but to compete with other makers offering cheaper engines, two lower-priced models were introduced.

The first of these, in 1937, was the Model C, priced at $17.50, which was joined, the following year, by the Model D selling at only $10.00 complete with tank, coil and condenser. Both these engines had aluminum pistons with two compression rings and a simplified carburetor in which the choke control was omitted. In addition, in the model D, a forged alloy connecting rod replaced the steel rod of the earlier models. Finally, in April 1939, all three models were given a minor face-lifting which included an improved contact-breaker and a new transparent fuel tank.

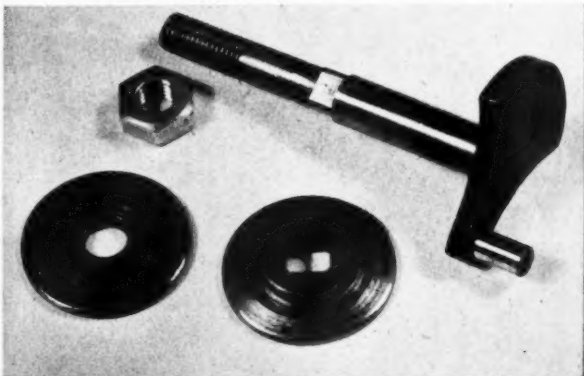
Modelers of pre-war years remember the Brown with affection. From them, from time to time, we hear regrets that the post war generation of model builders knows so little about the delights of the Brown Junior or of the fascination (and frustration) of the spark-ignition era in general. And, in fact, it is interesting to re-examine the Brown in the light of modern developments, comparing essential points of difference in respect of both design and performance.

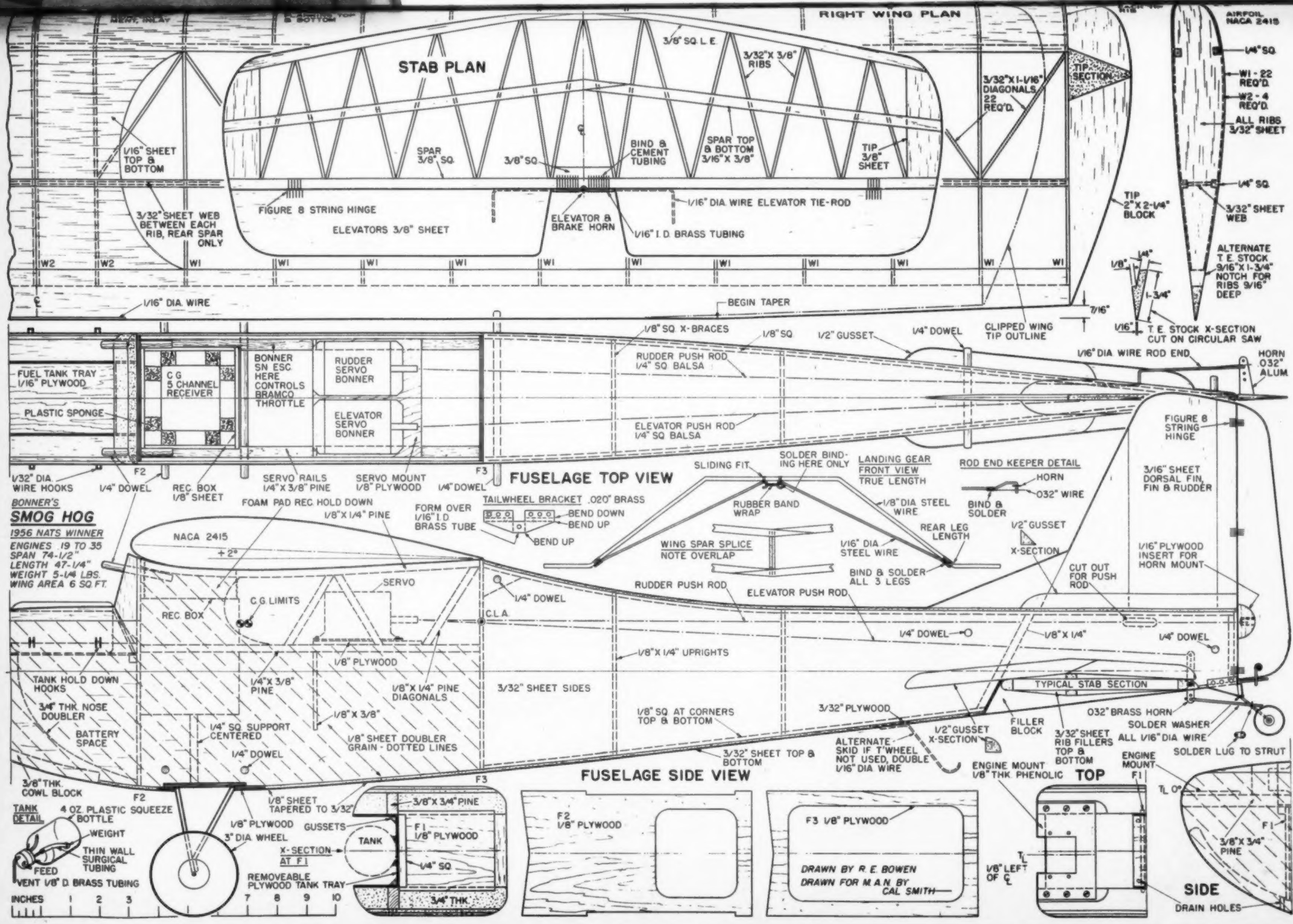
Being fortunate enough to possess a 1938 Model D, still in good condition, we have taken the opportunity of putting this engine through a regular test procedure, including a dynamometer check on output. The engine is actually one of the early Model D's, as first introduced in March 1938. These had shafts of steel not considered to be up to the usual standards of Brown quality and the later, im- (*Continued on page* 58)

Old maybe, but swung a club without overheat. Below—In 1930's this was really performance!



Brown Model D parts make interesting comparison with 1957 productions. Modestly proportioned shaft, tiny wrist pin, then adequate.





FULL SIZE PLANS AVAILABLE. SEE PAGE 56.

The designer's original airplane—5½ pounds of rugged, functional flying machine. Five-channel control by a CG transistorized receiver.

the Smog Hog

by R. E. BOWEN

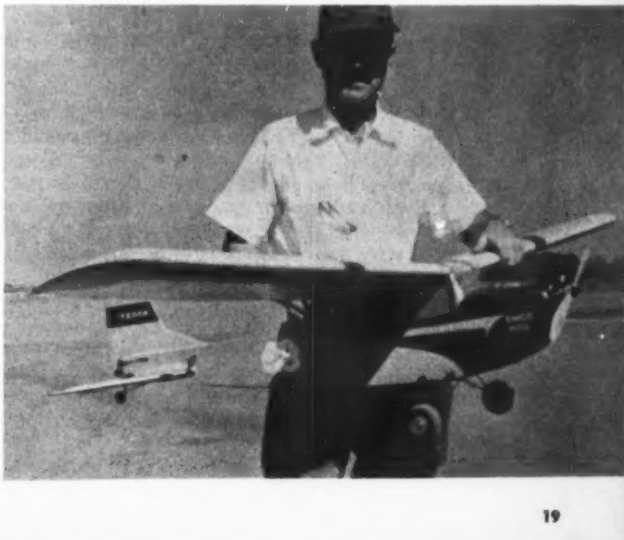
► The Smog Hog was the winner of the multi-class in the 1956 Nationals radio control event, and the California State Meet with a high score of 202 points. The design is the result of many months of designing and flight testing by Howard Bonner. The primary objective of the Smog Hog design was ease in building, low maintenance, ability to perform all the maneuvers required and still have a light enough wing loading for doing these maneuvers tighter and quicker without excessive losses of altitude. The airplane is simple enough for the beginner, but still lets the expert add his little changes. As the design stands now, it is a top notch contest performer. Although a C.G. 5-channel receiver and the new Bonner servos were used for the winning flights at the NATS, it has gone through a full stunt pattern (inside and outside loops too) with a single channel Deltron receiver and Bonner's Vari Comps cascaded. This single-channel version won the "Mickey Mouse" Class of a recent LARK'S contest.

The Smog Hog is a fully stuntable radio controlled model with hands-off recovery. This means you can relax when out for week-end pleas- (*Continued on next page*)

Howard Bonner putting the Smog Hog through it's paces. Note that smile of satisfaction. Light wing loading eases abrupt maneuvers.

Sensation of the radio event at the last Nationals was this great multi-channel winner. Outstanding are light weight, simple construction, terrific stunt ability.

Light weight and simple lines distinguish most really good multi jobs. For aerodynamicists, the wing uses a 2415 airfoil section.



ure flying, or you can wring it out in competition. If you should ever become confused (and who hasn't) or get too excited during a maneuver, returning all controls to neutral will let the airplane recover itself.

The size of the fuselage cabin permits the installation of any receiver on the market today with plenty of room left for batteries, servos or escapements, and your hands. The latest ideas for a practical, easily maintained model have been used, such as a two-wheel knock-off type landing gear, an expandable engine mounting plate that permits quick engine changes in the field, or it will break before damaging the engine and fuselage in a crack-up. Another unusual idea is a visual fuel supply in a crash-proof 4 oz. plastic squeeze bottle (holds Wilhold Glue) that has been modified to function as a "clunk" tank. The tank is mounted outside the fuselage aft of the engine, where it can be easily removed for cleaning, and is held on with rubber bands.

Since construction details are clearly shown on the plans, it is not necessary to go into a detailed construction discussion. However, highlighting a few points will enable the less experienced modeler to duplicate this fine model and it's superb flight characteristics.

FUSELAGE—The fuselage is the conventional strong box-type with sheet-balsa sides, top, and bottom. Side uprights help prevent the sunken appearance so prevalent on slab sided models. The windshield and side windows are not cut out, but are painted on to increase the strength of the cabin area. The flat windshield helps give some of the drag necessary to get a lower power-on and power-off speed differential. Parallel fuselage sides aid in squaring up the fuselage during the initial stages of fuselage assembly. Careful alinement of the nose blocks is necessary to result in the 0 degree thrust line and the fit of the firewall (F-1).

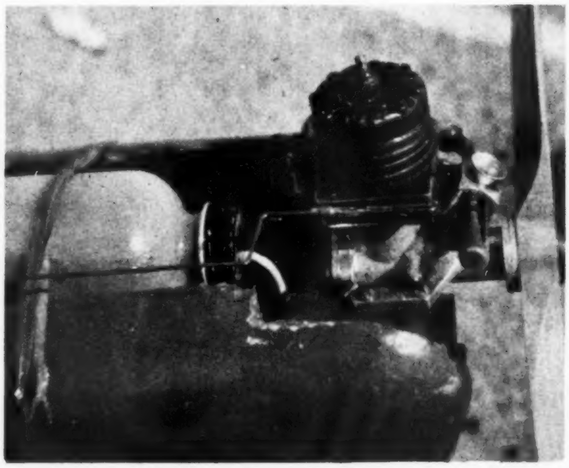
Before planking the top and bottom aft of F-3, install and line up the push rods (servos) or torque rods (Vari Comps) and make sure they operate freely without any binds. A little time spent now on the torque rods (if escapements are used) will prevent a locked control surface later. Use blind nuts to mount the Vari Comps on a bulkhead 1" ahead of F-3. The escapements should be mounted temporarily to check line-up of the torque rods, then removed, wired and installed when the fuselage is completed.

Cover the fuselage with nylon and dope. If additional strength is desired, the fuselage can be fibre-glassed on the lower side back to F-3. Make the fuel tank tray fit snugly over the battery compartment. Be sure to fuel-proof the nose and battery compartment thoroughly. Add steerable tailwheel bracket and cement firmly.

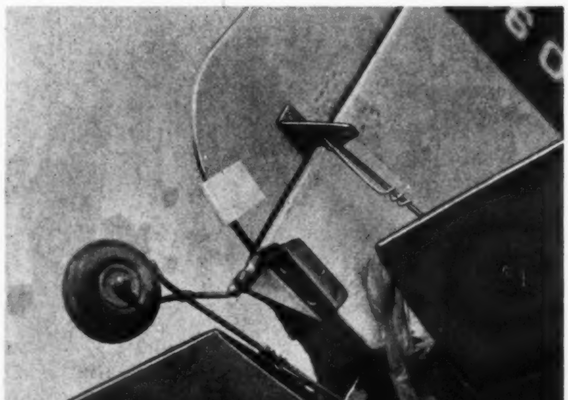
Install batteries required for your receiver in the battery compartment between F-1 and F-2 and pack any spare space left with plastic sponge to prevent vibration and impact damage. Vibration can work a well soldered joint until it breaks. Put a thick pad of plastic foam against F-2 and mount the receiver vertically against it, if any other receiver than the "CG" 5-channel receiver is used. Mounting of the "CG" receiver is shown on the plans. Note that the receiver is mounted high on F-2 to keep the center of gravity high and to provide accessibility. Follow the manufacturer's instructions on installing and wiring your receiver. If servos are being used, mount the rudder and elevator servo on the servo mounting board which is screwed to the servo rails. Wire servos to the receiver as per the wiring diagram supplied with the servos and receiver. Drill any necessary holes for switches and test jacks. Mounting the engine off center as shown on the plans will give straight flight with full throttle.

A Bramco thottle is used on the engine and is operated by a Bonner SN escapement that gives two speeds. The escapement is mounted on the *(Continued on page 55)*

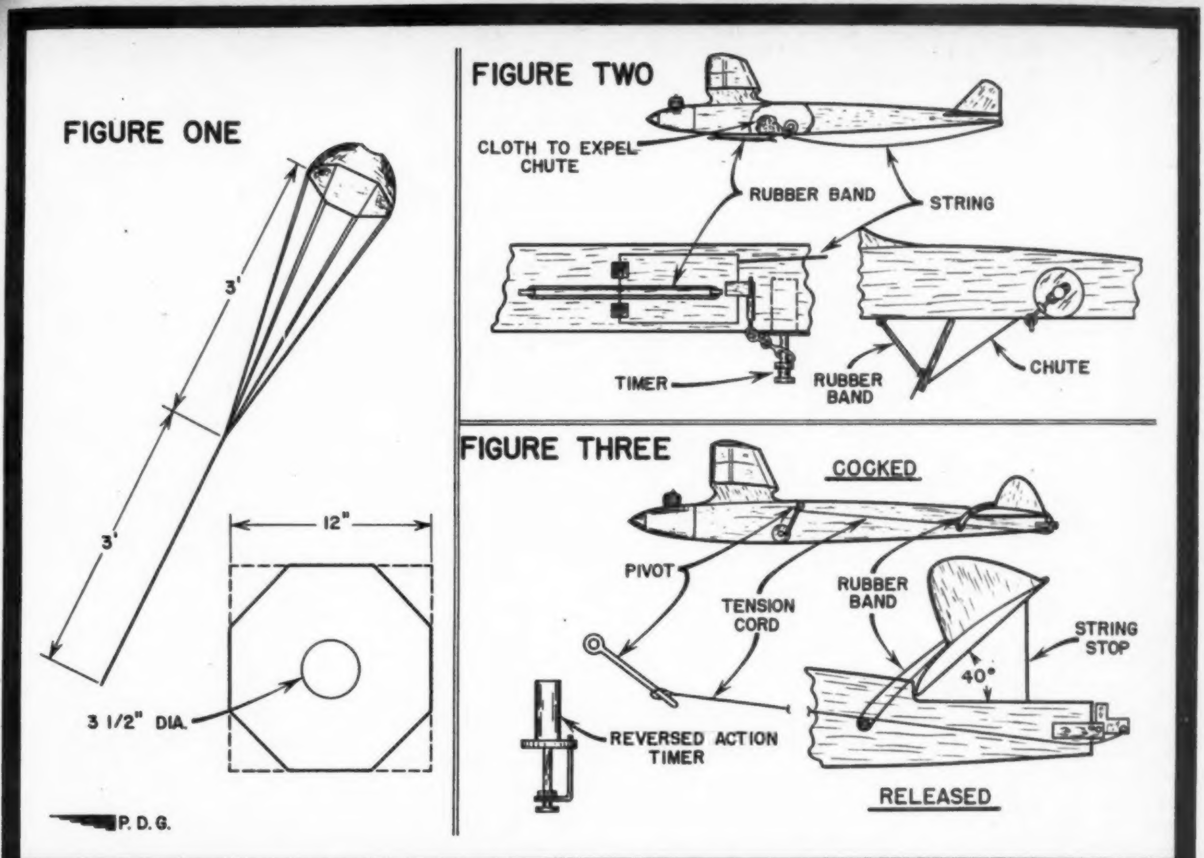
Preflight checking before every hop saves airplane and ensures top performance. Knock-off gear is a great repair eliminator, too.



Complete accessibility of engine and fuel tank leaves nothing to be desired. Fuel level visible in squeeze bottle used for a tank.



For ground maneuvers, up-elevator applies a brake to the steerable tail wheel. Details shown on the plans—compare with this photo.



These work! Figure 1—Properly designed chute. Four-sided won't work, more than eight lines unnecessary. Modeling silk too light.

Figure 2—Recommended set-up for chute-type dethermalizer. And, Figure 3, old reliable pop-up tail. There are tricks here, too.

These Blankety Blank Dethermalizers

From tame eagle to 12-gauge shot guns, the man has tried them all. A complete survey of what will, or won't, work!

by DONALD K. FOOTE

► When a newcomer gets an idea and goes to the trouble of building an airplane to test his idea, then smashes a good airplane because of it, he often curses all blankety-blank dethermalizers and becomes a dethermalizer hater from then on.

The chances are that this same experiment had been tried before, and if the newcomer had only known about it he could have avoided a lot of grief with an unworkable idea, and instead he could have spent his time improving some workable device that had been developed over a long period of time by many fliers.

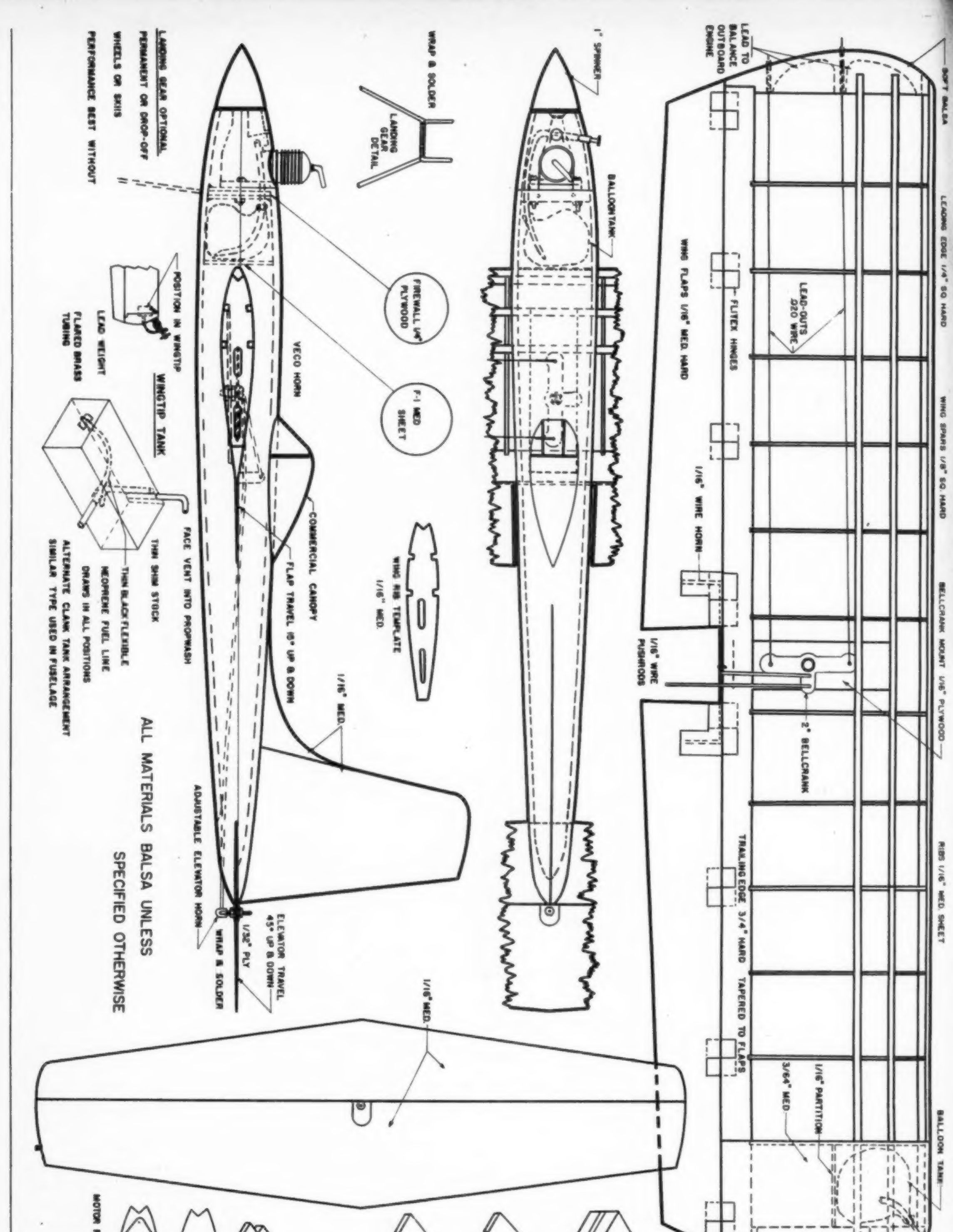
There have been many ingenious attempts to design dethermalizers. Some of them work and some of them don't. But, once a modeler experiences the thrill of watching his ship break out of a thermal and return to earth so that he can get his remaining flights in, and not have to return home minus his pretty airplane, he is a dethermalizer (or DT) fan from then on.

A DT makes it possible for a flyer to win a contest without the danger of losing his ship. While it still allows the flier the thrill of catching a thermal, it gives him the additional thrill of seeing his ship drop out of a powerful updraft before heading for parts unknown.

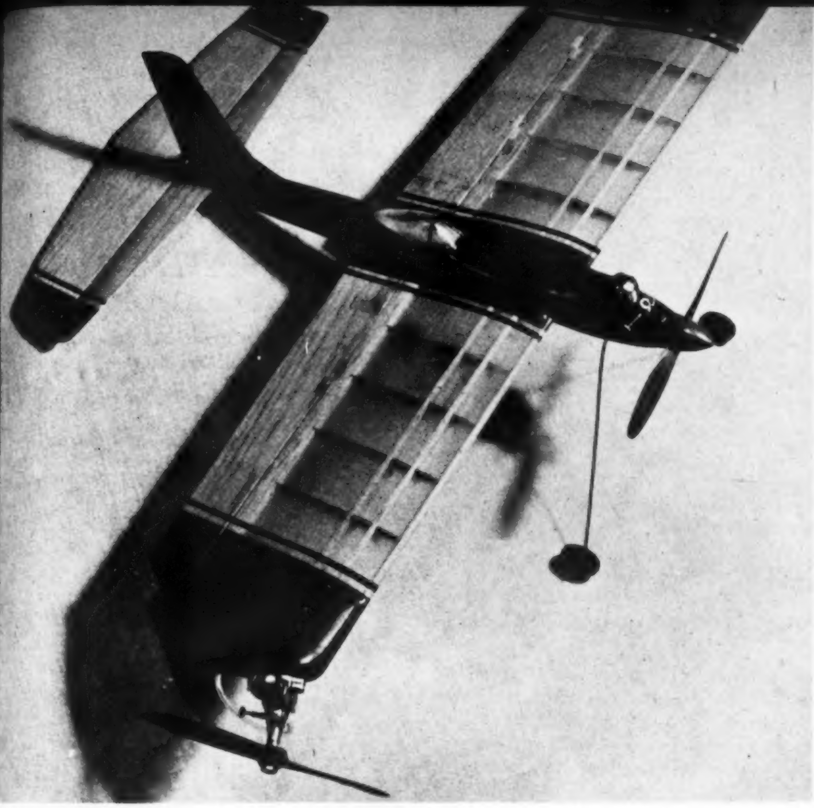
There is need, therefore, not only to describe some DT's that work, but also to describe the difficulties and shortcomings of some DT's, so that experimentors will not go on repeating the same mistakes of others.

Let me emphasize that this is not a theoretical treatise. It is the result of over ten year's experience with DT's. The first time that I used a DT in an AMA contest, in 1940, decision of the contest officials was held up until a ruling came from AMA headquarters on the legality of my flights. It was claimed that I was using a parachute to hold my ship up! Many, many ships have been lost and smashed up in order to obtain the information contained in this article.

Full-scale gliders use spoilers on the wings to increase their sinking speed, so it was logical, when DT's were first thought of, to try spoilers on models. A spoiler is simply a flat surface which (*Continued on page* 49)



FULL SIZE PLANS AVAILABLE. SEE PAGE 56.



Light construction, wing flaps and big flippers, coupled with that outward-pulling tip engine makes feasible towering eights and overhead maneuvering hitherto impossible. Avoid power lines.

Anyway you look at it, it's a sure show stopper. Almost looks like the free flight in action.

by CARL RISTEEN

Out of this world maneuvers on 200-foot lines possible on Half A engines! Picture it on Mono-Line, if you can.

Strato-Liner

► Why fly on long lines? The answer is obvious. With longer lines, much more flying space is available, resulting in immeasurably greater realism and smoothness in maneuvers. But when a regular stunt model is reeled out to fly on very long lines, complications set in. Control response falls off badly, the model develops a floating tendency, and slight winds become a major threat. As a result, the attempt often ends in disaster, and the flier firmly resolves to stick to short lines, and to put up with the disadvantages of poor realism and hurried, jerky maneuvers.

It was a desire to produce a model capable not only of handling extremely long lines, but of flying full pattern stunt, unhampered by a moderate wind, which resulted in the first Strato-Liner.

The theory behind the strange layout was that the engine on the outboard wing should supply a steady thrust, acting directly outwards along the lines, keeping them tight at all times, and supporting the weight of the model in overhead maneuvers.

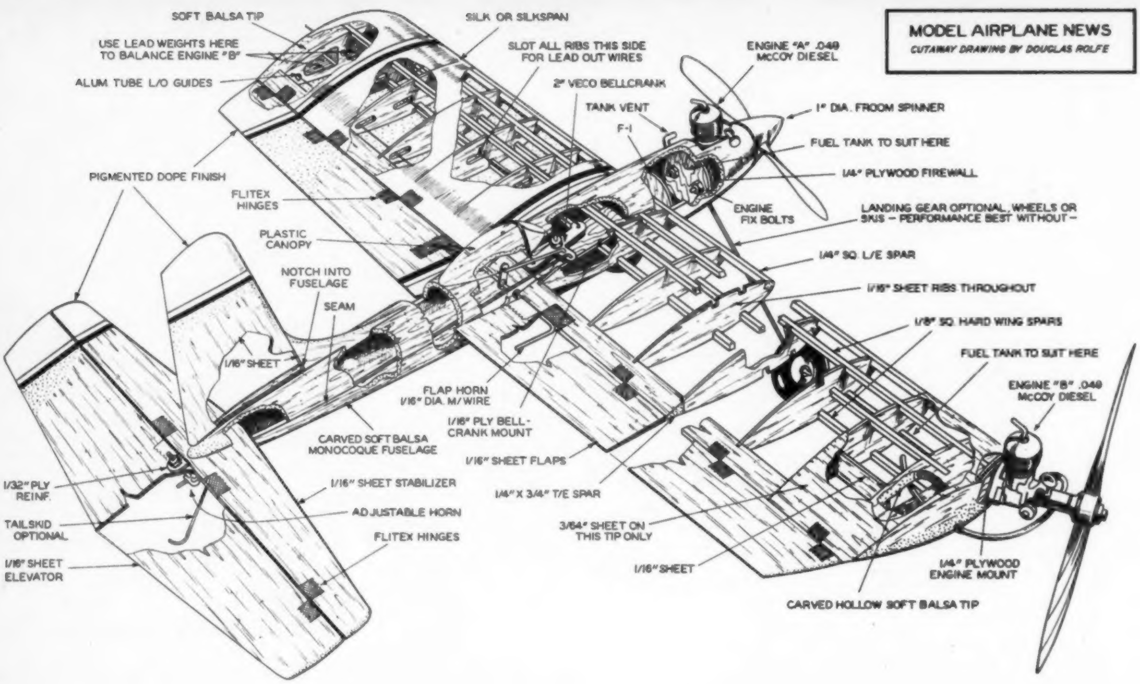
Accordingly, the first model was set up with the outboard wing engine pointing straight out of the circle.

Failure dogged the first attempts at flight, the model slowly sinking to the ground after the launch, with both engines screaming valiantly. Evidently, the drag of the outboard engine was too great, forcing the model into a badly crabbing attitude, in which the outboard engine pulled partly backwards, as well as outwards. Consequently, very little forward speed was possible. The addition of forward thrust to the outboard engine quickly remedied the situation, however, and the model began to really perform, although hampered still by a very severe wing rocking during maneuvers. A lead counterbalance added to the inboard wing tip, cured the wing rocking, and I reeled the model out to successive line lengths of 60, 100, 150, and 200 feet. Performance was very good, with excellent line tension maintained through all maneuvers, even on over 200 feet of line. Despite its weight of over twelve ounces, and its squarish, unstreamlined form, the model flew with surprising speed and maneuverability.

The second model, which is shown on the plans, was built in an attempt to lower the weight, and thus improve line tension in overhead maneuvers. Weight of the model came out at nine ounces. The use of a streamlined fuselage, offering less resistance to the side wind from the outboard engine, greatly improved line tension and handling. The realism of the model in flight is quite uncanny, and its long, screaming dives and huge, sweeping maneuvers are very impressive. The Strato-Liner has enough pep to enter a huge vertical eight immediately after taking off.

But if you want to wow the crowd at your next flying session, you'd better start construction now.

The fuselage is carved in two shells from a piece of medium soft balsa measuring 1 x 2 x 36 in. Trace the



Stratoliner continued

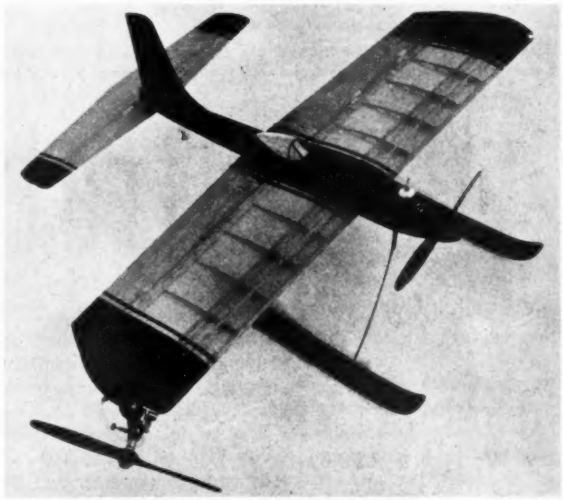
side and top view of each shell on the balsa, and saw to shape. Then round off each shell and hollow out, leaving about ⅛ in. wall thickness. Cut each shell to fit wing and stab airfoils, cut off the cowl section of the top shell, and cover each shell with silk for strength. Mount the firewall in the lower shell, double cementing, and apply a good fillet of cement, coat by coat. Mount the engine, attach a 1 in. spinner, and trim the lower shell to fit.

Construction of the wing is very simple, except possibly for the outboard wing tip motor mount. The tip is carved to rough shape from medium soft balsa, then rounded and smoothed to fit engine. Then the firewall portion is cut away as shown on plans, and a piece of ¼ in. ply substituted. Mount engine on ply, soldering nuts to a piece of tin can stock to hold them permanently in place. The ply firewall is then double cemented to the tip block. Correct setting for the outboard engine is 25 degrees offset from straight out, or 65 degrees from straight ahead. Check alinement of engine very carefully, as any upthrust or downthrust can be very troublesome.

The inboard wing tip counterbalance comes next. It should be just sufficient to balance the outboard engine and propeller. Do not try to skimp on the counterbalance, or wing rocking will be quite severe, making the model almost unmanageable.

Now for the fuel tanks. The simplest type of tank is the balloon tank, made from a small toy balloon. However, if you use Diesels, make sure that your balloons are unaffected by Diesel fuel.

Small clank tanks, although more work, also work very well. These may be soldered up from thin shim stock, or a commercial tank may be modified by the installation of a universal fuel pick-up. This may be made from a piece of small diameter, very thin-walled black neoprene tubing, with a lead weight on the fuel pick-up end. With this pick-up, it is possible to get nearly the last drop of fuel out of the tank, no mater what position the plane may be in. Regardless of what type of tank is used, the outboard wing tank should be made a little



In the snowy Canadian winter, the designer found these skiis to be a practical means of taking off and landing. Silk covering shown.

bigger, to insure that the inboard engine always stops first, the outboard engine maintaining line tension for landing.

Install the bellcrank and lead-outs, and cover the entire wing, including the centerpiece. Silk is preferable for its greater strength and low weight. Cover the wing flaps and tail assembly with silk, mount them, and install the control system, making sure of correct elevator and flap travel. Then cement the top shell of the fuselage in place, and add the cockpit canopy and fin. The cowl section is cut to fit closely around engine, and retained by small rubber bands stretched between wire hooks attached internally.

The finish of the model should be of a fairly low weight. The original model sports a clear finish over yellow silk on the wing and tail, red on the fuselage and wing tips, and blue for trim. (Continued on page 45)

Theory and the Stunt Model

by W. F. NETZEBAND, JR.

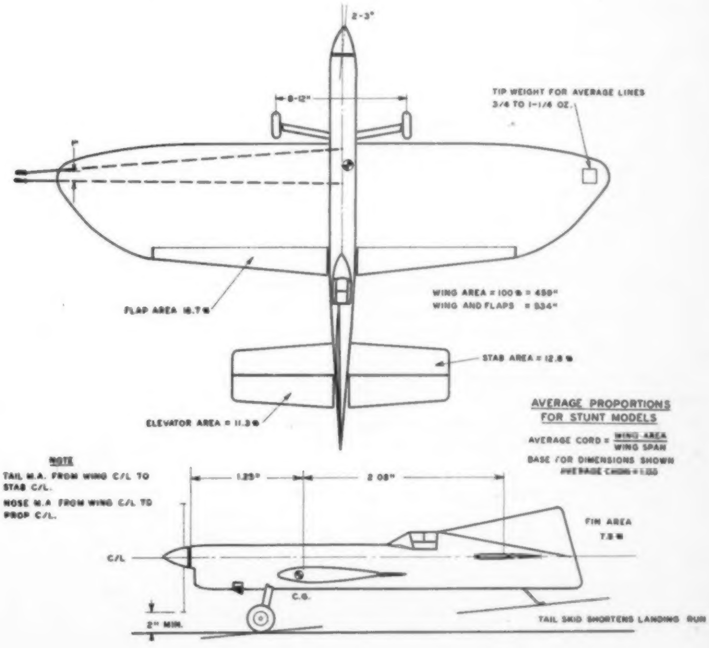
Though ukie ships rule-of-thumb in their design, they do obey aerodynamic laws. If you were happy maybe you had better skip this! Can you resist?

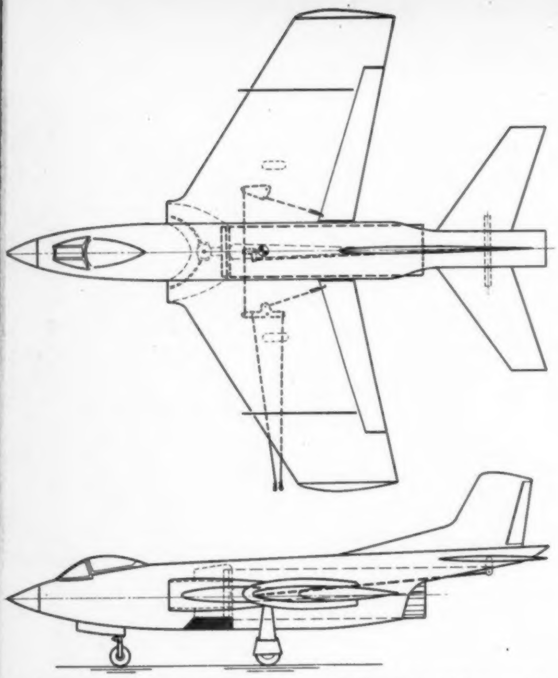
Ralph Yount holds Mars as Bob Palmer gets set for neat take-off and another smooth hop.

► Nature has created a number of problems, probably to give lots of people work, which make it impossible for an ideal machine to exist. Think of the mess if there were one ideal shape for an airplane, an automobile, a house, or anything! Therefore we must decide what we want and then slant our decisions to fulfill this end. Compromises always are necessary. Some of the data presented will be factual and proven, some will be the result of trained observation, and there will be some enlightened guesswork.

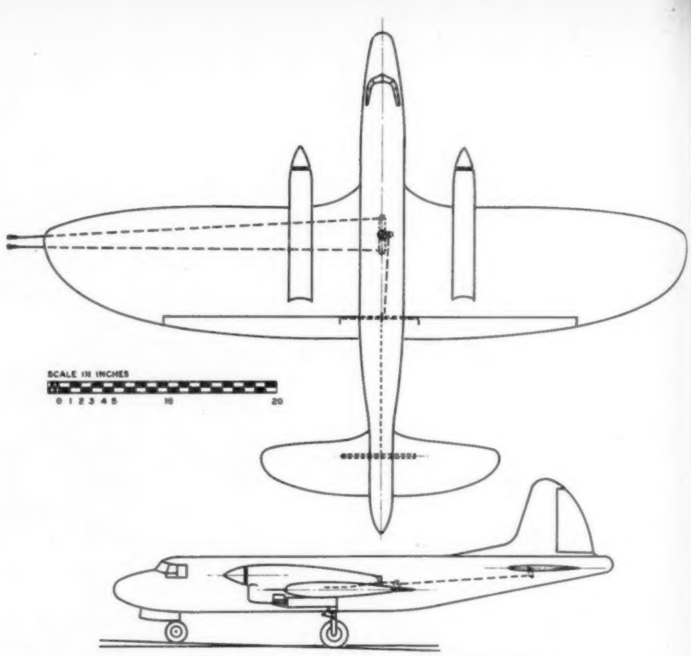
A brief word of physics seems appropriate. Airplane flight is a matter of equilibrium. Forces on a ship in level flight are balanced. Thrust equals drag and lift equals weight. When we unbalance any one of these forces an acceleration is produced in the direction of the increased force. The take-off is a good example. At the moment of release thrust exceeds drag and weight exceeds lift. The helper balances the thrust and the ground balances the weight. When released the ship moves forward and the drag builds up. When lift equals weight and drag equals thrust we have steady level (*Continued on next page*)

Cheer up, for you don't need a slide rule to go inverted! Hang up this handy dope sheet.





maginary ducted fan scale controlliner displays these tricky controls.



Semi-scale twin-engined job here ties in flying tail with flaps. Try one?

flight. To climb we cause the wing to lift more so we move upwards.

The modern stunt ship did not explode upon the scene fully grown, but rather, grew up slowly. After we learned to keep a balky engine and overloaded airplane off the ground for a full tank, the logical step was aerobatics. The loop was our first milestone and it was the proud fellow who had enough power to turn a big lumbering loop. With the development of the symmetrical airfoil, we started bashing ships on inverted flight. Probably the biggest step forward was the development of the glow plug by Ray Arden, which relieved our puffing monsters of eight to ten ounces of dead weight and gradually gave us more power. Airplanes became smaller and more agile and stunt became aerobatics instead of balloon busting and wheel rolling plus 40 or 50 consecutive inside loops. Third big step was addition of flaps to the wing which gave us ships capable of the modern pattern with its square turns.

Just what makes a stunt ship a stunt ship and not a speed job? Or more simply, what characteristics do we need to stunt? The airplane must be capable of supporting at least 20 times its own weight. It must be stable for steady level flight, yet unstable enough to turn quickly without a lot of lost motion. It must be rugged due to high flight loads, yet light. Stunt ships almost universally use a symmetrical streamline for a wing profile. This is a low lift, low drag, combination so the area of the wing compared to other types is outsized. It must also fly at a reasonable speed. The designer is allowed much latitude for artistic fulfillment but must keep proportions commensurate with full-scale airplanes. And last, but far from least, a high finish is important.

Stunt ships fall into two speed categories, fast and slow. Fast is 70 MPH and up, while slow will be below 70. The fast ship suffers several disadvantages, such as requiring high grade rhythm and coordination an the part of the pilot. Scoring is based on smoothness and repeatability of flight paths, which require a real maestro at the controls. The slightest mistake in judgment will result in a splat! Roundness is difficult to achieve and the judges stand a good chance of snapping a neck muscle following a square turn. Fuel feed is a larger problem due to the higher forces created by high speed turns and the airplane must be lighter than if it were flown slower. However, structure must be stronger, and consequently either heavier or more cleverly designed or both. The author has seen a few people capable of this type of stunt and it's quite a show stopper, but points accumulated are usually smaller than picked up by those whose maneuvers can be seen. The author enjoys nothing better than wringing out an 85-mph Half Fast, but for money we prefer 60 MPH.

The slow airplane is not without its problems either. At lower speeds, tug must be achieved artificially. However, the maneuvers, by being slower, can be flown through, with minor corrections in attitude being made during said maneuver. For instance, the recovery from a wingover is made at 4 feet. At 85 mph this 4 feet is used up in 1/32 of a second or this is the difference between a good pullout and a basket of pieces. Most judges like to see the maneuver and will give better scores for patterns where they can see everything you do. Your fuel flow problems will be easier solved and your airplane will undoubtedly last longer. The choice is yours and we'll show how to get either type.

In order to determine the size of our wing we have to start somewhere making assumptions. This is where experience helps. The formulae we will present are surprisingly close to the truth, but allow some latitude for errors which we take advantage of in our original assumptions. Much of the following information is printed in more detail, including some airfoil charts, in the 1951-52 Model Aeronautic Yearbook. Frank Zaic was kind enough to allow us to modify and present his work on Stunt Models. Let us assume an average large airplane with 432 sq. in. effective area—power from a .35 engine—giving a level flight speed of 60 MPH—wing span 50 inches and average wing chord 9 inches; built without flaps, it should weigh 2 pounds. That's enough for now.

First calculation is the Reynolds number. This number is a dimensionless constant at a fixed airspeed and wing chord. The higher the number, the more closely the airfoil works as it does on full scale aircraft. Normally it is used to allow accurate data to be produced with small airfoils in wind

EQUATION 1

$$N_R = 9350\ Vl$$

V = AIRSPEED IN MILES PER HOUR
l = WING CHORD IN FEET

SO....

$$N_R = 9350\,(60)\,\frac{9}{12}$$

$$N_R = 420{,}000$$

EQUATION 2

$$L = .000132\ A\ V^2\ Cl$$

A = AREA IN SQUARE INCHES
V = VELOCITY IN FEET/SECOND
L = LIFT IN OUNCES

EQUATION 3

$$R_{min} = 2 \sin 11.25°B$$

B = LINE LENGTH or $R_{min} = .4B$

60' LINES $R_{min} = 24$ FT
70' LINES $R_{min} = 28$ FT

EQUATION 4

$$C.F. = \frac{W(V)^2}{32 \times R}$$

FOR C.F. WE WILL SUBSTITUTE L_{max} WHICH GIVES:

$$R = \frac{WV^2}{(32)L}$$

GOING A STEP FURTHER WE CAN SUBSTITUTE OUR LIFT EQUATION FOR L_{max}:

$$R = \frac{WV^2}{(32)(.00132)(Cl)(A)(V)^2}$$

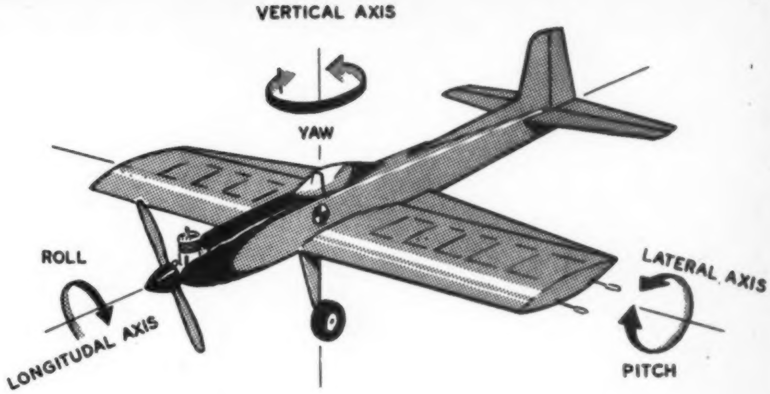
EQUATION 5

$$R = \frac{W}{.00423\ C2\ A}$$

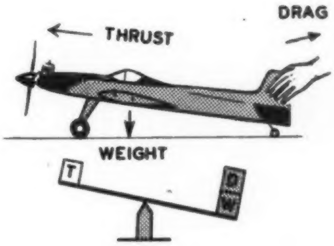
W = OUNCES
A = SQUARE INCHES
R = FEET

tunnel tests and to convert this into data useful for full scale use. Full explanations of this may be found in the Model Aeronautic Encyclopedia No. 2. For our stunt model it will be as shown in Equation 1.

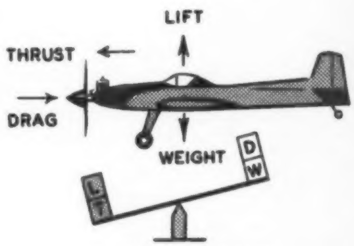
Sounds big until we consider full sized Reynolds numbers run around 20 million. We will use this as a tool to look up lift coefficients from graphs. However, for our comparatively narrow range of Reynolds numbers and airfoils we shall list maximum lift coefficients for the more commonly used sections. At the end of this series of articles will be a list of books from which more specific and detailed data may be derived. Our Reynolds number mainly says "An airfoil (*Continued on page* 53)



CONTROL OF AXIS A MUST FOR STABILITY



TAKE-OFF

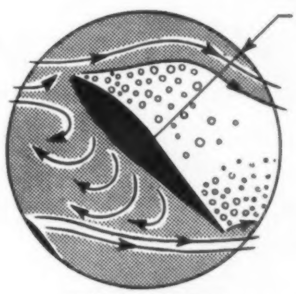


LEVEL FLIGHT

TURN WITH 12% AIRFOIL

$$R = \frac{32}{.00423\,(.9)\,(432)}$$

R = 19.5 FT.
OR A
39 FOOT DIAMETER



STALLED AIRFOIL

EQUATION

5 FT. RADIUS
2 LB. MODEL
(Cl OF 1.6)

$$5 = \frac{32}{.00423\,(1.6)\,(A)}$$

OR

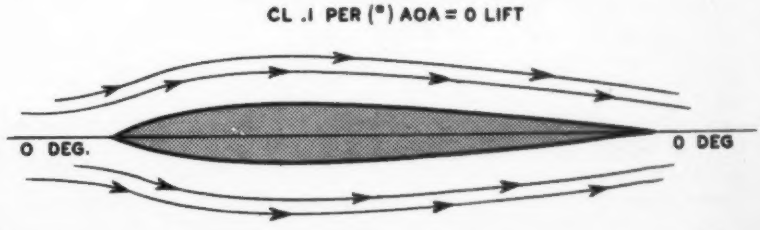
$$A = \frac{32}{.00423\,(1.6)\,(5)}$$

COEFFICIENTS

NACA 0009	.85	@ 7°
NACA 0012	.90	@ 8°
NACA 0015	1.00	@ 10°
NACA 0018	1.15	@ 12°
NACA 0012 WITH FLAP	1.6	@ 8°

LEVEL FLIGHT MINIMUM A.O.A.

CL .1 PER (°) AOA = 0 LIFT



High cabin profiles have a right turn tendency under power. Lt. J. R. Becknell tunes needle adjustment before allowing ship to ROG.

MAKE *that Model* FLY!

by JOHN SPRAGUE

Almost any model will fly if you give it a chance. So don't blame the airplane if fireworks start. The next time you have a new gassie to test-hop keep these facts in mind.

► With each passing year, the model airplane hobby seems to be attracting more and more beginners. Unfortunately, the number of people who try unsuccessfully to fly the models they build is astronomical.

However hard the manufacturer tries to make prefabrication foolproof, the flying of the model ultimately rests with the builder. And, because control line has so many natural advantages, easier-to-find sites among them, the manufacturer has favored ready-to-fly, and highly prefabbed craft, to be flown "captive." Comparatively little has been done about the flying of rubber-and gas-powered free flight models, the latter being the bigger problem by far.

As the gas-powered free-flight models are planned on paper they all will fly—or can be made to fly. But when the builder launches the plane it may loop, dive, spiral into the ground or just flutter around like a wounded duck. Getting it to fly properly calls for a proceedure that the veterans mysteriously call "adjusting the model." A better word is "trimming."

To successfully trim his untested aircraft, the builder has to know what he is up against. What he is up against usually is a lack of understanding of why an airplane flies. Although the kit or magazine-plan project may be assumed to have the correct proportions and areas (so fundamental design is not the problem), it is the variations between finished planes that unbalances the designers skilful blending of "forces" and this, in turn, unhorses the green flier. Not understanding what goes on, he is unequal to the task of restoring the set-up the designer intended. No two planes are exactly alike, or fly alike even if they look alike. Happily, a couple of generations of modelers have worked out a system for trimming the new model.

Preliminary Check-out: First, does the model faithfully

Low wings will fly. Walt Mooney releases his scale Mooney Mite in the American class PAA Load event at the Nats, believe it or not.

Launching his Corben Ace scale model is John Sparnicht. Scale jobs can be tough to trim but the Corben is ideal subject to adjust.

High pylons want to lean to the right under power. Carl Wheeley, one-time FAI gas champ ponders thermals before cranking the prop.

follow the plan? That is, does it have the same angular setting of wing and tail, as seen in the side view, as specified by the plan? Does it have same dihedral, or uptilt of the wing?

Secondly, is it accurately constructed and assembled? When you look at it from the front, or from the top, do the flying surfaces line-up accurately? Or does the wing or tail droop low on one side and high on the other, or is the wing askew? Or is the rudder and fin cockeyed? Does the propeller pull in the direction specified—the plan may require down thrust (propeller tilts down) or side thrust (prop tilted to one side, usually to the right side when viewed from the back or top of the model).

Thirdly, are the flying surfaces warped? It may not matter how rough the covering looks but it is essential that wing tips or stabilizer or fin not be warped. Warps can be romoved by holding the offending surface over a steam kettle, then twisting the wing to its correct angle, and holding it there while it cools, usually a matter of a minute for the entire operation.

Unless these things are as they should be, the model may be impossible to fly.

The Glide Test: The basic principle of trimming any free-flight gas model consists of making it glide properly first, afterwards adding further adjustments to control the flight under power. Since any adjustment made to improve or correct the glide, will afterwards drastically disturb the flight under power, the two types of adjustments must be kept clearly separated in the mind.

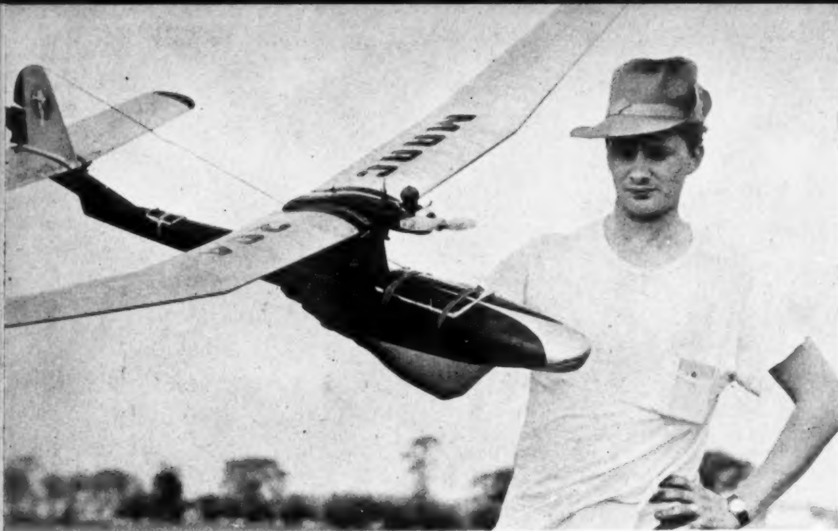
First step in gliding the model, is to check for tail heaviness (stalling), or nose-heaviness (diving). It is desirable to make glide tests over grass, not on pavement. Select a calm or near calm day. Wind can smash the average model during tests. If the plane follows the plans and is balanced at the proper point (the center of gravity, or CG, or balance point, can be checked by supporting the model with one finger at each wing tip), the ship should not stall or dive too violently. A small model is hand-launched for the glide test by pointing its nose at the ground perhaps a room's length away, and then shoving it ahead firmly and smoothly as it is released. Never throw the plane, or point it upwards, for either action will make the ship rear nose upwards, as if it were stalling—which it might not do at its normal flying speed. The great majority of free flight models can be hand-glided quite easily. Bigger and heavier models may require running a few steps while launching.

It sometimes helps to walk fast or run slowly, holding the model in level flight position until you get the feel of when it will lift from your hand. Running slowly forward you can wait for this slight feel, then assist the model very slghtly as it is launched from the hand—but keep the nose down!

A proper glide is a straight line; the plane should land in its two wheels, never swoop three-point with the tail down. The latter landings look pretty but are almost a sure indication that the plane will stall when it flies faster under its own power. Actually, the best glide should look a trifle nose heavy.

If plane is tail heavy: Add weight to the nose (this shifts the CG forward), or increase slightly the positive angle of the stabilizer (increases tail lift). To alter angular setting of wing or tail, use a thin sliver of sheet balsa (1/32 on a small plane, 1/16 on a large one) or match cover paper, to pack under the appropriate edge of the flying surface. Where the wing is movable, it can be moved back slightly on the fuselage (moves the center of lift toward the back) to decrease tail heaviness. Additional glide tests are necessary, perhaps a half dozen or so, until the corrections are sufficient to smooth out the glide path as desired. If plane is nose heavy, apply any of the above corrections in reverse. Such corrections can be used in combinations, either for tail or nose heaviness, in stubborn cases.

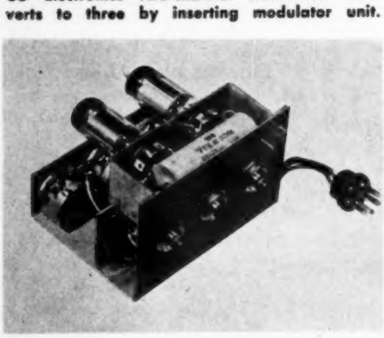
Warning note: A stable flying machine always has slightly more of an angular setting in the wing than it does in the tail. It is not wise to alter the angle of the tail drastically, as too many people do, because, when it equals or exceeds the angular setting of the wing, the ship will exhibit extremely (*Continued on page* 61)



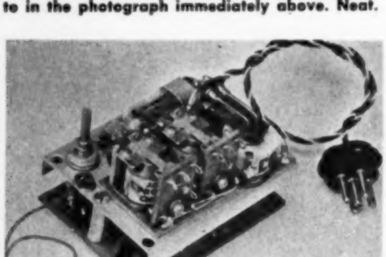
Though slightly overpowered by Amco 3.5 Diesel, Berkeley Seacat by Roy Bourke, Can., does well.

Radio Control News

CG Electronics two-channel transmitter converts to three by inserting modulator unit.



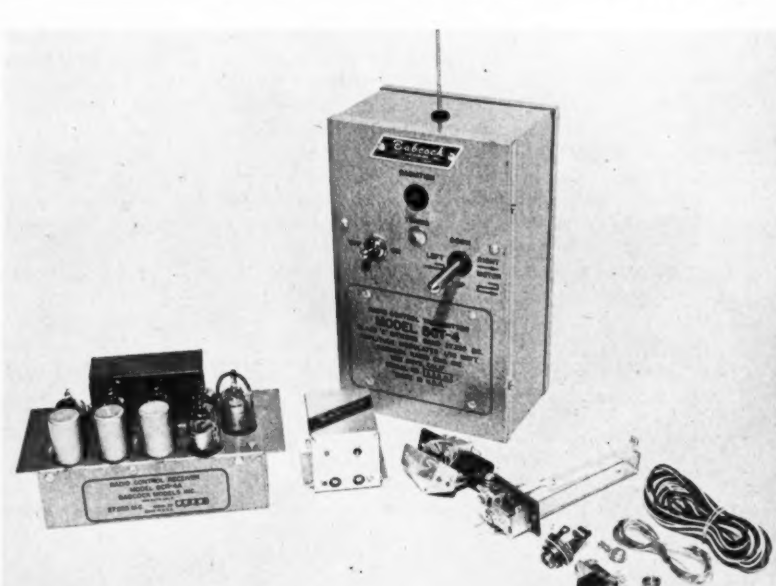
This photo shows the modulator unit referred to in the photograph immediately above. Neat.



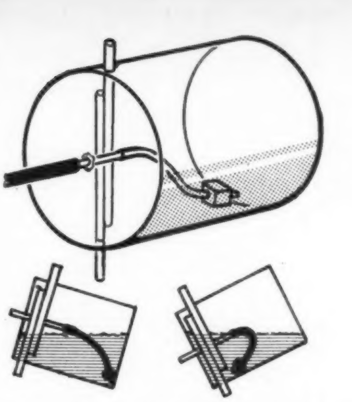
And this is the CG two-channel receiver. Two Jaico relays and, right, the two-reed bank.

by EDWARD J. LORENZ

► What better way to start off the new year than with a letter like the one received from Mr. Donald Sump of Sheridan, Wyo. He saw our mention of Miles Wilson, who lives 450 miles away in Montana, and dropped him a line regarding RC work, since this is the first person he has run into in his part of the country. Mr. Sump, who is a public accountant and is 52 years of age, has made a practice of traveling more miles than we care to think of, just to get in some RC flying. Here's the part we liked, even though we won't be able to make it. Mr. Sump has offered to set up a flying session with FREE steaks for RC flyer and wife or helper. You can't beat a good western steak, fellas. There will be an airport to fly from, with plenty of prairie nearby. Anyone interested should contact Mr. Sump and advise if they could make it on either Memorial Day or Labor Day. Maybe this will turn into another RC get-together for the prairie states, such as we have in other parts of the country. Mr. Sump went all the way to Los Alamos just to watch some RC flying. He came home and built a Berkeley Rudderbug and used Deltron RC gear. This start in RC work brought him up to getting the new Babcock 465mc 2-channel unit, which he will install in a Live Wire Champion. He has used practically all sets mentioned in this column and has had no trouble,



Speaking of equipment, the Babcock three-channel, showing servo, motor control, escapement, etc.



Chuck Boyer's baby food fuel tank. Requires right flex tubing, short line to work well.

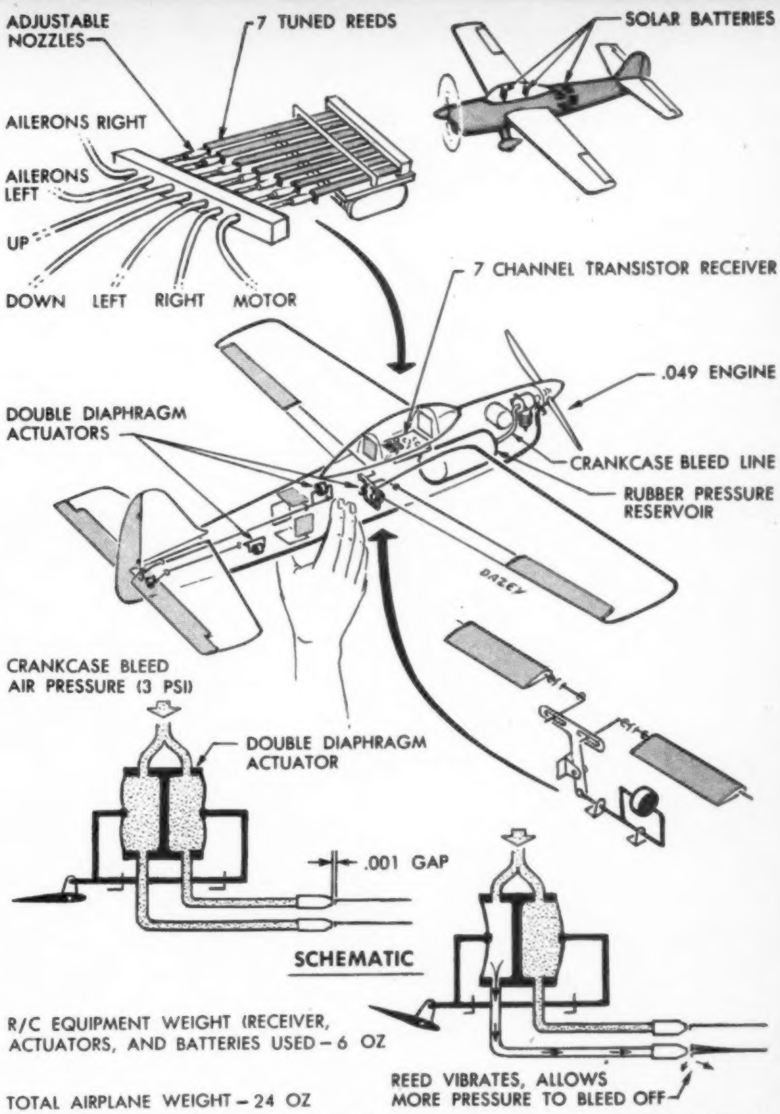
The so-called gentlemen's event is jumping now that the masses have taken over!

since they 'operate-out-of-the-box'. These units include Deltron, Badaco, Babcock and the Citizen-ship 27mc receiver. This last unit was highly recommended for its foolproof operation and we've had reports to confirm this from other sources. Anyone who can discuss the Ideal models from the days of Cecil Poli, could probably wrangle two steaks out of Mr. Sump.

From Bob Rector, Box 199, Salisbury, N.C., comes news of his new Over & Under biplane, which should be finished by now. Using a Fox 35 and Schmidt 5-channel equipment, Bob is using ailerons on the bottom wing in addition to rudder, elevator, throttle and steerable tail wheel. This ship should bring some interesting information since Bob has received a considerable amount of advice to the effect that ailerons 'are no good'. This is one of those things where everyone talks about it but no one does anything. Good luck, Bob, and we'll keep everyone advised regarding the use of ailerons. (Ailerons should have differential action, perhaps as much as five times up as down, due to the greater drag of the down aileron –Editor.)

Are you one of the RC fans, builders or "designers" using buzzer type modulation directly into the grid of the crystal-controlled transmitter? We purposely placed quotes around the designer category since anyone versed in the basic principles of radio can see the trouble arising from such a system. Be sure to read TECHNICAL TOPICS for further details.

Stan L. Friedman reports on the First Annual Radio Model Contest held last September near San Diego which was sponsored by Convair. In Multi-channel, it was Dean Kenny, Howard Bonner and Jerry Slovacek; in Rudder Only it was Bill Williams, R. Happisch and Gary Hauch; (*Continued on page* 43)



Will it come to this? Frank Dazey let his imagination run wild on this futuristic racing job.

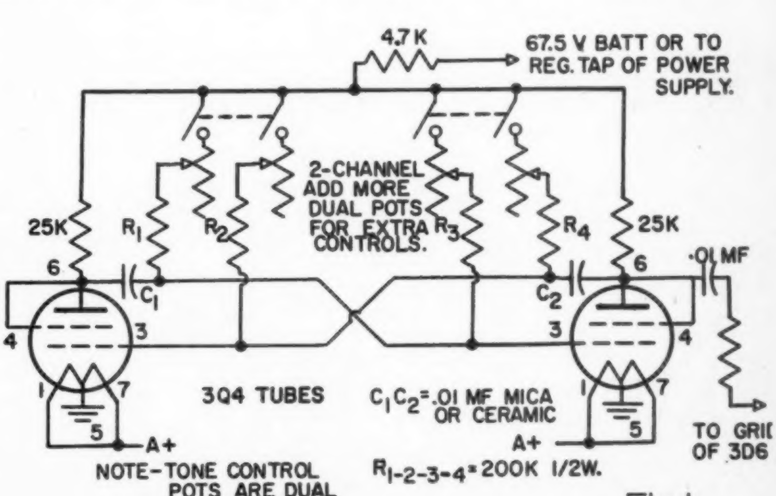
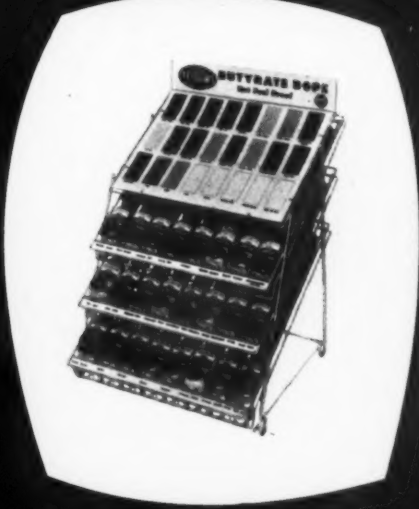


Fig. 1

Really big news for you! Now you can get Testor's unequalled-for-quality Butyrate Dope in handy 1-ounce bottles at just 15c exactly the economy size you want for trim, detailing, any special decorative application where only small quantities of color are required. And the same superior formulation, of course: every property of high hiding power, easy brushing or spraying, controlled shrinkage, excellent rubbing, high flexibility, film toughness, pure color brilliance . . . *plus the added special feature of being HOT FUEL PROOF, too.* This is what you've been waiting for perfect companion to Testor's Butyrate Dope in the familiar quarter-pint jars . . . in your choice of a broader-than-ever range of today's 24 most-wanted colors! See your dealer now.

Look for this handy dispenser at your dealers



TESTOR CHEMICAL COMPANY • ROCKFORD, ILLINOIS

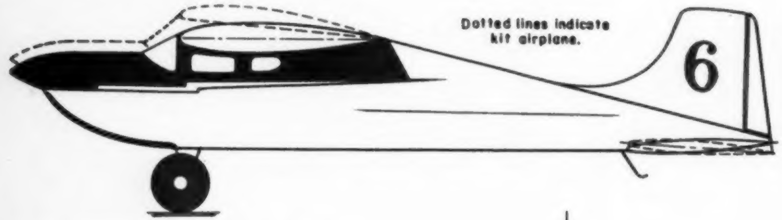
EUROPEAN SALES OFFICE: STOCKHOLM - STOCKSUND, SWEDEN

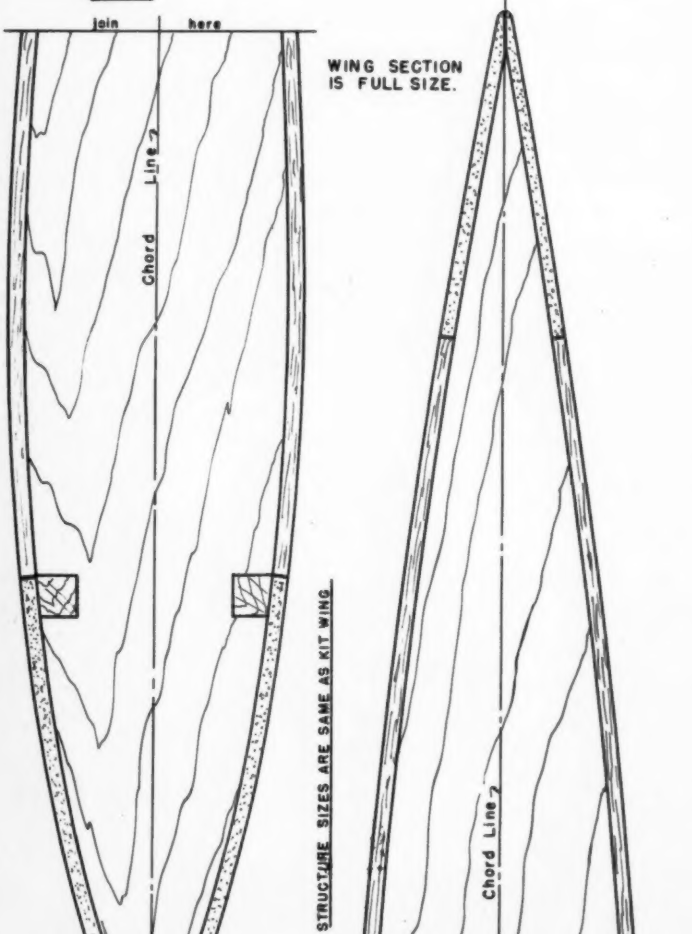
Symmetrical RC

How to convert the Live Wire Sr., or Cruiser, to symmetrical wing section. Idea can be worked out on other ships as well. The rib pattern is full size.

MODIFICATIONS:

1. Hold wing T.E., drop L.E. until wing chord line is parallel to thrust line.
2. Drop thrust line, deck & windshield 3/4" as shown.
3. Drop L.E. of stab. to bottom of fus., raise T.E. 3/8" above L.E.





FOREIGN NOTES

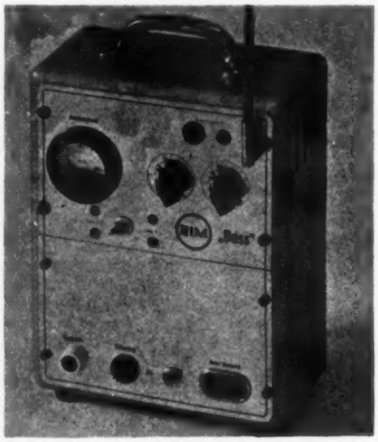
A monthly world-wide round-up of technical developments, designs, significant industrial products.

P. G. F. CHINN

More RC Gear for Germany

In marked contrast to the situation in England, where, at the present moment, only one manufacturer (E.D.) now offers complete RC equipment, the range of radio gear available in Germany continues to expand.

From Graupner comes "Kinematic," a motor-driven four-position servo intended primarily for boats, but appearing to have some possibilities for aircraft use. And, to accompany "Miniking" transistorized receiver previously mentioned in this column, Radio-Rim of Munich announce the "Boss" 27.12 MC crystal-controlled transmitter. According to reliable sources, this, the product of a firm long known to radio hams, promises to be the best outfit thus far offered to German modelers.



Neat crystal-controlled transmitter for 27.12 by Rim, of Munich. 400 cycles tone modulation.

News from France

This column's periodic regrets that we do not have enough news from France are at last bearing fruit. Following on the worthy efforts of the USAF Chad club to get together with French modelers, we have obtained a most comprehensive assessment of the French modeling situation from M. J. L. de Neuflize, a Parisian modeler of long standing and a MAN reader since 1936.

French modelers, asserts M. de Neuflize, are as active and skilful as many others but not very numerous and generally not contest minded. They are also poor and that is why most of them fly gliders. Materials are obtainable but France suffers from being a highly centralized country: that is to say, French life is largely centered around Paris and this is also true of modeling supplies. Except for simple basic materials, one has to go to Paris, where, generally, modelers' requirements are adequately dealt with. French motors are, as a rule, unexciting, but we must realize that they are general-purpose engines; they must turn large props as well as small ones and power a boat as well as a stunter, a free-flight or large RC job. Several high-powered engines do exist, the most well-known being the Micron 29 and 60 racing units, but they are very expensive and are seldom, if ever, on sale outside one or two Paris hobby shops.

Our correspondent's remarks bear out the conclusions reached by the writer's brother who, in the South of France recently, searched in vain for a well-stocked model shop and, of such supplies as were available, found prices prohibitive.

M. de Neuflize concludes that he believes French engine makers to be following the wrong road and suggests that they should cut down the number of different types they at present make in order to concentrate on a few essential models which could employ pressure die-castings in place of sand castings and be lighter, cheaper and sold in larger quantities.

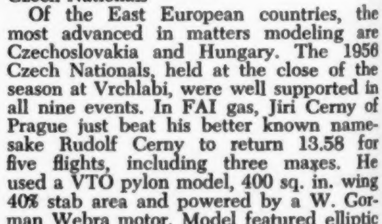
Britain's Carter Customs

By recording an almost unbelievable 139.8 mph to set a new (subject to FAI confirmation) Class I world record, plus a convincing win in the 1956 World Speed Championships in Italy, Ray Gibbs' Carter-Special motor proved itself the world's hottest .15 cu. in. mill to date.

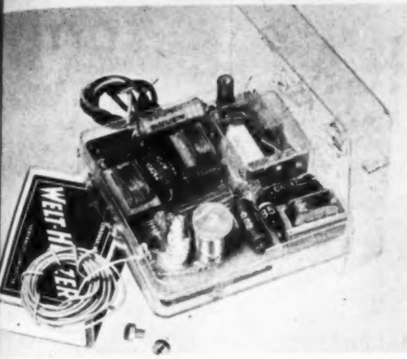
Carter motors are one-off custom-built specials for which Fred Carter takes the crankcase of one well-proven racing motor (usually American) and proceeds to put in a completely new set of innards in accordance with his own ideas. In the case of the present .15 motor, the crankcase/cylinder casting is that of a McCoy Red Head 19. It is evident that the motor puts out more power than a stock Red Head, despite a 25% reduction in displacement.

Czech Nationals

Of the East European countries, the most advanced in matters modeling are Czechoslovakia and Hungary. The 1956 Czech Nationals, held at the close of the season at Vrchlabi, were well supported in all nine events. In FAI gas, Jiri Cerny of Prague just beat his better known namesake Rudolf Cerny to return 13.58 for five flights, including three maxes. He used a VTO pylon model, 400 sq. in. wing 40% stab area and powered by a W. Gorman Webra motor. Model featured elliptic stab and outer panels and Goldberg sections. It weighed 18 oz. Rubber event winner Zdenek Mach used a model fairly typical of current Wakefield design: 45 in. span, 45 in. long with 25% stab and 20% in. twin-blade folding prop. Winning Nordic 42 glider by Jan Heyer was a



Japanese OS Minitron two-channel receiver. Has five tubes: one 1T4, one 1U4, and three 3Q4's.



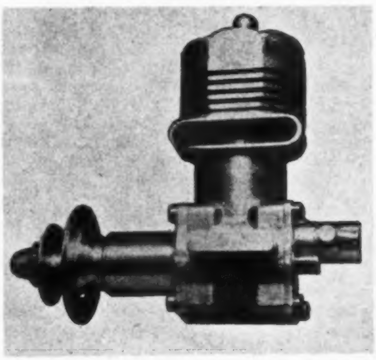
Rim's Miniking tone receiver with transistor power converter, operates 24 hours on only 6V.

graceful, slim fuselage job with modified MVA 123 wing section and small 17½% stab.

Winning speed jobs were of typical design. Top speeds were 109.3 mph in the .15 class, 124.3 for the .30's and 133.6 for the .60's. Speeds on this occasion were not outstanding, having regard to high performances set up by the Czechs in previous speed events. (For example, in the FAI World Speed Championships, the Czech team returned a higher aggregate than any other country, as a result of which next year's Championships will be held in Czechoslovakia.) Maximum speed in the jet class was 136 mph. Winning stunt job by Miroslav Herber had a .35 cu. in. motor—an unfamiliar displacement in Eastern Europe which appears to suggest U.S. influence, as does the use of a NACA 0018 wing section. The spin spanned 51 in., had 484 sq. in. wing and weighed 30 oz.

Interesting Aussie Wakefield

Coinciding with the decision to postpone until 1958 (and probably modify) the scheduled FAI rule changes relative to Wakefield and free-flight gas models,



Carter Special .15 that set record of 139.8 is hotter than a Mac Red Head .19. Some pumpkin!

have come to a number of reports from keen contest men who, in anticipation of the rule changes coming into effect in 1957, have been testing out "new rule" models during the past season. While it is a pity that the keen efforts of these enthusiasts are not to be rewarded with a chance to fly their new models in official 1957 contests, their reports are illuminating and, in most cases, present a much less dismal picture of "new rule" models than has been envisaged hitherto.

One such report comes from Paul Van Leuven of Perth, Western Australia. In mild, cool conditions, his "1957 rule" Wakefield, with (*Continued on page* 57)

How Good Are the Russians?

(*Continued from page* 11)

ing, test-flying, the actual contests, prize-giving and sight-seeing, lasted nearly three weeks. Added to this, it is reported that most of the competing teams had undergone two to three weeks' "training" in their own countries immediately beforehand!

All this is in strange contrast to the urgency of Western national and international contests. Seldom do we spend more than two or three days in conducting an international meet and as many as sixty modelers will make nearly three hundred flights in a single day in an event like the Wakefield. The difference in attitude is quite basic and creates a situation which is slightly paradoxical having regard to the political philosophy of the Soviets. In the Western world, the unknown modeler has exactly the same chance as the expert. He can buy the world's best materials, motors and accessories and, by his own individual and unsponsored efforts, he can reach the level of the expert and, with him, represent his locality or country. If he goes abroad to compete for his country, he, and the famous expert will be likely to travel modestly and to be accommodated in barracks, hangars, or even tents. The program will be swift and full of hard work and a few days later he will be back home again, probably a bit breathless at the pace of things. If, instead, he elects to fly purely for the fun of it and has no contest aspirations, he can still enjoy the best in materials and equipment.

Most of the modelers of Russia and the Soviet satellite countries, on the other hand, can only hope to enjoy the best facilities that the hobby has to offer when they, in return, have something to offer their country. For example, for this select few, there are often available specially built motors. These are developed by the official modeling institutes and constructed with the assistance of the nationalized industries and are unobtainable by the ordinary modeler.

In fact, modeling for the fun of it has far less of a place in Russia than in America or Britain. A few of us may tend to adopt a slightly lofty attitude towards prefabbed kits and other evidence of modeling for the millions that exists in the West. But it is by such commercialization and the wide interest fostered by the distribution of kits, etc., assisted by second-to-none modeling magazines, that we now have industries which so ably provide us with abundant and varied equipment, technical innovations and first class materials.

We have mentioned the high standard of flying of Russian Wakefield enthusiasts. This is certainly a class in which the Ruscians can compare favorably with the best that the West produces. In the Nordic A2 towline class they appear to be a little below international standards, however. Nor, on their showing in the last three Soviet Internationals, do they rate more than an average grading in free-flight gas at the present time. This appears to be due, at least in part, to the lack of powerful motors and to a tendency to run available motors at speeds well below their potential maxima.

A commonly used motor for both free-flight and control-line in Russia, is the MK-12. Designed by O. K. Gajevsky, a leading member of the Russian DOSAAF movement, it is a twin ball-bearing 2.5 c.c. (.151 cu. in.) Diesel. One or two of these engines have found their way westward via the satellite countries and thence through neighboring Western countries.

As regards performance, the MK-12s starts easily and runs well. It seems to be most happy on a prop of about 9 in. diameter and 6 in. pitch. The rpm is then around 9000 which is reasonably good and comparable with the average European .15 cu. in. Diesel on a similar sized prop. The actual horsepower that can be realized for contest purposes, however (slightly under .22 bhp at 12000 rpm on our test) is appreciably less than that obtainable from the best .15's available in Western countries.

Substantial claims have been made for a revised version of the MK-12s, known as the MK-12k. This model has a shock-absorber contra-piston set-up similar to that of the O.K. Cub Diesels and a special combustion chamber shape incorporating an "anti-detonation" cavity. Outputs of circa .35/.36 bhp (i.e. about 10% higher than for the best Western .15's) have been mentioned for this model. On the showing of the MK-12s, these figures seem more than a trifle optimistic and, in fact, we have it on the authority of one of the top Russian fliers that the MK-12k gives no more performance than a stock E.D. Racer–i.e. about .26 bhp.

We cannot believe, however, that the Russians, if they are to expand their participation in World Championship events, will be content to rely on second rate motors for the power events. There is every reason to suppose that the official modeling institutes will be hard at work to produce an engine capable of challenging the best available elsewhere. The manner in which the Czechs, through their own model aviation research center at Brno, have developed small .15 cu. in. racing engines actually superior in performance to our own factory-built high-performance glow .15's is an indication of how this can be achieved.

Russian models of today are generally similar to those of the West, especially in the recognized FAI classes. Some radical differences in structural technique are, however, evident in the Wakefield rubber class.

There is no doubt that, despite the almost fanatical loyalty to the Wakefield shown by many noted exponents in the West and the somewhat excessive space that has hitherto been devoted, in some European magazines, to Wakefield models over a period of many years, the Russians' models are fully equal to those of the West in this highly developed class. That they achieve this without the use of balsa and by the adoption of some highly complicated structural designing is all the more creditable.

The models flown by the leading Russian Wakefield exponents, such as were seen this year at both the Soviet States Internationals and in the F.A.I. World Championships in Sweden, mere mainly constructed from a native reed. This was supplemented by hardwoods where rigidity was of prime importance, such as in wing spars and longerons. Resulting structures were light and quite resilient. At the same time, they appeared to be reasonably warp-resistant in changing atmospheric conditions. This was no doubt due to the considerable use of anti-distortion diagonal bracing.

Configuration generally favored is a long-fuselage, parasol wing layout with tip dihedral. Fuselages are mostly of square or diamond section. Propellers are mainly twin-blade folders with blades carved from hardwood. Much of the rubber strip used in Russia and many East European countries is of round section, 2-3

(*Continued on page* 42)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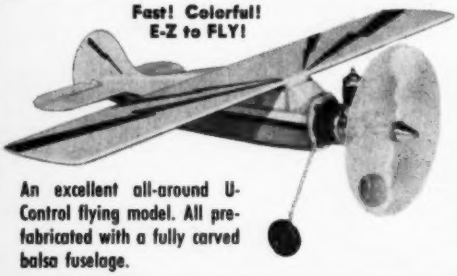

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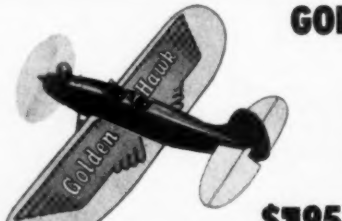

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mm. diameter, the Hungarian "Lactron" rubber being of this type and, seemingly comparable with flat type contest rubber used in Western countries.

The present F.A.I. record for model jet aircraft, as well as the official absolute world speed record for any type of model plane, is held by a Russian pulse-jet engined model, built by Ivan Ivannikov, with a speed of 275.004 km./hr. (170.8 mph). The Russians appear to have taken jets more seriously than their efforts in pistoned-engined speed models which lag far behind the McCoy and Dooling speeds of the U.S.

Ivannikov's model consists of a large pulse-jet engine with metal wings and tail unit attached directly to it and a short, fixed, offset landing gear. Specially developed for jets by Ivannikov, and used on this model, is a quite ingenious solution to the question of tank layout, which, of course, is so often a problem with this type of model. In this, the standard intake cowl is removed and a considerably lengthened cowl, with an integral central intake duct, takes its place. The annular space formed between the wall of the central duct and the cowl forms the tank. This is pressurized by means of a forward-facing tube which leads into the front part of the tank on the inner side relative to the flight circle. (The model flies clockwise.) On the outside is a "last-drop" feed bulge from which gasoline is fed to a vertical spraybar with three jets. Control of delivery rate is provided for by a simple screw adjustment inserted in the feed pipe.

General design of Russian pulse-jet motors follows that of the Dynajet, but usually they are much more bulky. A standard Russian design is the RAM-1 pulse-jet designed by Michael Vasilchenko. It has the following specification: length 855 mm. (33.66 in.); maximum diameter 64 mm. (2.54 in.); tailpipe diameter 34 mm. (1.35 in.); operating frequency 150 c.p.s; fuel consumption 1.5 gr./sec. (3.2 oz./min.); static thrust 1-1.5 gk. (2.2-3.3 lb.); dry weight 320 gr. (11.3 oz).

From this it will be seen that this engine is half again as long as the Dynajet and, although considerably lighter in weight, has a lower overall efficiency on account of its lower pulse frequency.

Variations on the RAM-1 theme have been seen on models by Vasilchenko and Ivannikov, producing claimed thrust figures as high as 5⅜ lb., but here the increase in performance has been obtained by increasing volume (e.g. 3 in. combustion chamber, 1.6 in. tailpipe) rather than the operating frequency, which seldom seems to be more than 160/180 c.p.s. Fuel consumption is the region of 7⅛ oz./min.

An exception to this approach, however, was seen at the 1955 Moscow national meet in an enclosed-engine model by V. Kurakin which closely resembled the Czech Sladky's model that had won in Moscow the previous year. It has a high-frequency unit of approximately Dynajet size (20.1 in. long, 2⅜ in. combustion chamber, 1¼ in. tailpipe) and was probably inspired by the Letmo unit used by Sladky which, itself, is essentially Dynajet in conception.

Russian free-flight gas models largely follow the normal pylon layout. The standard contest class is the F.A.I. "International" formula, i.e., motor not exceeding 2.5 c.c. (.152 cu. in.), a power loading of not less than 7.06 oz./c.c. and a total surface (wing plus stab) loading of 3.93 oz./sq. ft. minimum. Tendency is towards the maximum area permitted under these rules. A tip-up stab dethermalizer, operated by the usual fuse, is standard equipment, the fin generally being positioned on the fuselage forward of the stab leading edge—a layout which is also used by the rubber enthusiasts.

The recognized F.A.I. contest class (Nordic A2) has also been adopted in the case of towline sailplanes. As we have said, the Russians do not appear to be up to the best International standards in this category, but doubtless they will improve when faced with such opposition as is provided by Germany and the Scandinavian countries in the A2 class and can witness the highly developed technique of the leading exponents of these countries.

Radio-controlled models have been built in the Soviet Union for a number of years and RC endurance records have, from time to time, been established, the present world duration record for power driven models being, in fact, held by a Russian, Peter Velichkovsky, with a time of 3 hr. 6 min. 38 sec. He used a large shoulder-wing ship fitted with two-channel equipment of his own construction. Radio-control is practised by only a very small minority of modelers in Russia, however, and no ready-made equipment appears to be available at the present time.

In conclusion, we would say that there is every indication that the appearance of the Russians on the international modeling scene, marks a turning point in the development of the hobby in the Soviet Union. Possibly it will never resemble the hobby as it is known in America, with its constantly expanding variety of equipment and innumerable other developments, but there is little doubt that closer contact with Western ideas will be of benefit to Russia's model builders as a whole.

Radio Control News

(*Continued from page* 31)

and in Mickey Mouse, or single channel, it was Vic Nelson, Bill Amour and Joe Murphy. One feature of the contest was the try for the greatest number of points for precision flying during the two-day meet. Jerry Slovacek, with 611 points, nosed out Bill Williams at the last minute by 17 points.

We took our Cheryl Ann tug, equipped with the new Babcock 465mc receiver, out for a run and ended up giving it a distance check, since we happened to have a large lake and a rowboat. Might as well have left the boat tied up since the equipment functioned perfectly at a distance of over 600 feet, the transmitter being held about 24" off the ground. At this point we had to be signaled that the boat was headed back towards shore, since it was a mere speck in the water. While we highly recommend that you follow the manufacturer's specifications when making any RC installation, we were forced to do a hurry up job of installing the receiver and antenna in a new cabin and deck unit. This installation placed the antenna on the ceiling of the deck house and the receiver was placed directly on top of it, the receiver lying on its side and separated from the antenna by a 3/16" thick piece of plastic foam. Three hours of almost continuous running failed to show up a single missed pulse. A deBolt 3PN servo was used for rudder control and a Distler Aristo-Rev motor was the main driving power.

From Miles Wilson, W7AIR of Helena, Mont., comes news that his 3-channel CG transistorized reed equipment is working out very well. He also has one of the old 112" Cavalier planes (made famous by Berkeley in the '30's.) which seems to fly about the same, whether at 10 pounds or 13 pounds.

While possibly coming under the heading of New Items or Technical Topics, we thought that a brief mention of a new German receiver, designed by Radio-Rim of Munich, would be of interest. This very compact unit uses a DL67 tube for the detector, followed by two transformer coupled transistor amplifiers. A 400 cps tone modulates the ¾ watt transmitter needed to operate the receiver. The novel feature of the receiver is in the use of but a 6-volt battery for the power requirements. What about the high voltage on the plate of the tube? A transistor power converter, similar to that given in an earlier issue of this column, is used. Current drain from the 6v source, with no signal is 15ma, rising to 40ma with a signal. The power converter puts out 25v at .4ma. Quite clever and novel to say the least.

Now that the Babcock 465 equipment is gaining in popularity, and since the antenna and detector circuit is separate from the balance of the receiver, users have wondered about making their own antenna and detector circuits. The antenna appears to be nothing more than "a rag, a bone and a hank of hair." However, the type of diode used is not readily available on the open market and the more commonly used diodes (for general RC work) will not work. For the time being, it would be much easier to purchase another antenna unit from Babcock.

More and more RC users are turning to the B & S Products Co., (Box 135, Mercer Island, Wash.) Transistor Power Converter, now being produced in 30v, 4-5ma; 45v, 4ma; and 67v, 8ma sizes. These units have been checked out on practically all commercially built receivers. However, slight changes in the installation hookup are sometimes required for particular receivers. It is rcommended that the WAG receiver use a separate filament battery so that A plus and B minus can be tied together. A DPST switch may be used to break connections. For those of you using the power converter with a CG reed receiver, a 22k ½w resistor is connected between B plus on the receiver and the B plus terminal of the power unit. One side of a DPST switch is connected across the 22k resistor and the other half of the DPST switch is connected in the filament circuit of the receiver, A SPST switch is used in the A plus lead of the power converter. In operation, it is necessary to close the SPST switch to the power converter first, leaving the DPST switch in the OFF position for a few seconds and then closing it. This is necessary due to the 3mfd capacitor placed in the receiver between B plus and B minus. If the 22k resistor is not used or if the DPST switch is closed when the converter is switched on, the current surge which charges the 3mfd capacitor may overload the converter. These converter units can be classed as one of the really new innovations in RC work for the past year.

From Dr. W. A. Good of the AMA-RC Committee, comes a notice regarding the manner in which various "designers," and we use the term loosely, are modulating their transmitters. This consists of employing a buzzer which operates directly into the grid of the oscillator tube. Come now gentlemen, surely you can do better than this. Did you know that a buzzer produces an arc, which for this purpose, cannot be effectively filtered to the point of keeping within plus or minus 25kc of 27.255mc. The FCC is quick to ferret out such cases, which could result in drastic curtailments of our frequencies.

Fig. 1 gives the audio modulation cir-

cuit, which is the companion of the regulated power supply described last month. Fred Mann, 37 Cartwright Avenue, Sidney, N.Y., submitted the circuit for reed equipment use. This circuit is perhaps one of the most stable that can be devised. Return of the grid resistors to B plus instead of to ground and the 4700 ohm resistor in the B plus lead are the determining factors. Since grid modulation of our MOPA transmitter is used, a low value of plate voltage can be used on the 3O4 tubes. The audio tuning pots are of the dual type, since each resistance leg must be varied a like amount. The high value of 2 megohms will allow an audio tone to be generated which is below 100 cps. For general work .1 megohm pots will cover the range of most reed banks. As many sets of pots and 200k resistors may be used as required; two are shown. No details are given on the control box, however, switching in of the dual pots must be done by a double pole switch. A little brainwork should enable you to build a suitable control box, utilizing a Lord mount for a universal on the stick, or springs could be used for centering the stick.

This month we shall give the beginner to RC a resume of multi-channel RC equipment. However, we wish to point out again, that the beginner should not be talked into buying a multi-channel piece of equipment for his first crack at RC. That is, unless he has a flush wallet and a sense of perseverance. Manufacturers can make these units practically foolproof but not darnfool proof. At the present time, there are three basic methods for obtaining multi-channel operation on a given carrier frequency. These are reeds, tuned filters and various forms of tuned relays or discriminator circuits. At present, the reeds are enjoying a high degree of popularity and there are a number of reliable manufacturers of same throughout the country. A reed unit can give you from 2 to 6 channels per reed bank and this system is the only one whereby you can operate one reed or a dozen reeds with no increase in the number of tubes or associated components. It does require a bit of understanding to obtain proper operation from reed equipment. Great strides have been made in the past year in the design of audio circuits so that once you have become familiar with receivers and transmitters, in general, you should have no trouble getting into reed equipment. All of the manufacturers employ tubes throughout in their receivers, except CG electronics, who use two transistors and one subminiature tube.

One of the oldest manufacturers of reed equipment, and actuators, is Schmidt Radio Controls, 350 East 33rd St., Erie, Pa. This is 5-channel equipment, very well designed and used with excellent results by a large number of RC flyers.

The Badaco Mfg. Co., 2801 Penick Street, Shreveport, La. markets a 3 and 5-channel reed unit. The novel features of this equipment being: receiver packaged in a space 3" x 3" x 2¾", completely enclosed in an aluminum box; use of their regular carrier or straight tone transmitter for multi-channel reed work; a reed unit control box having built in voltage regulation; complete waterproofing of the receiver for marine operation.

CG Electronics Corp., 305 Dallas St., N.E., Albuquerque, New Mex., was the first manufacturer on the market with transistorized reed equipment and the units may be had in from 2 to 5 channels. This is the equipment which won the multi-channel event at the '56 Nationals. Lightweight and the lowest filament drain of any unit are the important features. This equipment has been well proven in the field and under tough competition in contests. Buy either the ready built and factory tested units or a set of parts for assembling your own receiver. The 5-channel transmitter, which is hand held, has a regular stick for control and is highly stabilized for reliable operation. Photos show the 2-channel receiver and the transmitter, which can be converted to 3-channel operation by inserting the modulator unit shown at the bottom.

Another 5-channel reed outfit is manufactured by Bramco Products, Pleasant Ridge, Mich. One might call this 'just another reed job' except for the fact that this unit claims a reed bank which has at least a 5 cycle margin, with the low frequencies being up to 10 cycles spread. This means more reliability and a greater tolerance for drifting of the audio tone in the transmitter. For those desiring the ultimate in performance and appearance, Bramco builds a Gold Chip Special. All contacts in the reed bank and the relays are gold plated for minimum contact resistance and tarnish-free surfaces. Actuators are also available from this company.

The above was a general resume of reed receivers, pointing out a few of the pertinent points on each unit. There are others on the market and your local hobby dealer can advise you as to the availability of them. The above equipment is on 27mc.

Tuned filter receivers for multi-channel work are under the sole manufacture of Babcock Models, Inc., Box 3134, Van Nuys. California. This equipment is as foolproof in operation as anyone could want, especially the 465mc equipment which has no tuning controls of any kind. The 2-channel transistorized 465mc receiver requires but one 30v hearing aid battery and it is ready for operation. The main feature of this particular 2-channel unit is that both channels can be operated simultaneously. Babcock also produces a 3-channel unit for use on 27.255mc. This is a tube version receiver which has won wide acclaim for its reliability in the hands of the newcomer as well as the expert. This unit is shown in a photo, along with accessory, actuators and instal-

lation kit. Either Babcock unit (27mc or 465mc) is the ultimate in engineering and operational reliability.

A recent entry by Citizenship Radio Corp., Indianapolis, Ind., into multi-channel sets, has produced the 2-channel unit which was described in the November issue of MAN. This is a tuned relay type of unit which is very compact and assures you of the same degree of performance as that obtained with the Citizenship 27 and 465mc single-channel receivers. The hand-held transmitter is fix-tuned on the audio frequencies, as is the receiver. This ready built 2-channel unit should gain in popularity in 1957. The staff is planning an airplane project around this Dual Channel equipment.

Next month we'll clean up this outline of equipment, aimed at helping the newcomer choose his receiver, transmitter and accessories.

Stratoliner

(*Continued from page* 24)

Flying: Of first importance is a set of strong, light and thin control lines. Four pounds test nylon fishing line was found to be ideal by the author, although its stretchiness necessitates the use of a larger than average control handle. With very stretchy lines, as much as 18 in. line spacing may be necessary, in order to have good maneuverability.

Make your first flight on 75 to 100 feet of line, to allow yourself to become accustomed to flying on longer lines, and to the handling of the model. Any climbing or diving tendency should be corrected by warping appropriate incidence into the stabilizer. It is best to fly over grass, as the model reaches a tremendous speed in long dives on 200 foot lines, and a crash on pavement would be quite disastrous. After you have felt out the model, you will find stunting a lot of fun. Huge vertical eights, for example, are a joy to behold. All in all, Strato-Liner is a model having very good flying qualities, and is quite out of the rut.

Guardian in Styrofoam

(*Continued from page* 12)

three formers: the tail piece, firewall, and Number 2 former that holds the landing gear wire. From the Number 2 former back to the tail piece is solid Styrofoam, covered with 1/32 balsa sheeting. This 1/32 balsa is very easy to work with. When wet, it can pretty nearly be tied into a knot without fear of splitting and, when cemented to Styrofoam with Silkspan covering, makes a very good foundation for smooth painting. For flying scale fans wishing a superb finish, I suggest using the 1/16 soft balsa covering in place of the 1/32; this will give you a good sanding surface that, when covered with Silkspan and painted, will have a very hard surface that will take a perfect compounding job.

Most modelers I meet ask, what is Styrofoam? Styrofoam is made by the Dow Chemical Co. It is a polystyrene rigid plastic expanded 40 times. It is 30 times lighter than water, five times lighter than balsa wood, will stand temperatures from subzero to 175°F. without losing its original shape. Since there is no capillary action, this material will not absorb water. A piece 2 x 12 x 36 weighs only 12 ounces. Dopes or any acetate cements cannot be used directly on Styrofoam. This is where the 1/32 balsa sheeting protects it from the strong paints and cements. There are over 20 brands of cements and glues that can be used directly on Styrofoam without fear of disforming or melting. (List

at end of article.) Tensile strength is as high as 65 pounds per square inch. Styrofoam can be planed, sawed, or cut into fine strips, using a sharp knife. A bread-knife will do as good a job as any. There is no grain, so no worry about splitting.

Where can you get it? Well, the best place I know is your local florist. If he doesn't have any handy, he can tell you where the florist supply house is; they will have plenty on hand and the price works out at about 1/6th the price of balsa wood. I used the green-colored Styrofoam because of the need to take photographs. The white Styrofoam seems to have a finer texture, resulting in a harder finish surface. Get three pieces of the White Styrofoam, 2 x 12 x 36. This will leave you enough to experiment with on a smaller sport plane. Let's start building.

As always, study the plan carefully. Get to know the layout thoroughly before starting. Obtain a Berkeley Guardian canopy and cowling. Cut to full wing size, two pieces of Styrofoam, 7 x 9½ x 21¼ long. Trim down to the airfoil with long blade knife, then finish with coarse sandpaper for the first stage (leave ¼" over size). Make the airfoil similar to the one shown on profile plan. At the thin ends, always sand (strokes) in toward heavier section (middle) with medium grade first, then fine grade sandpaper.

Make up main spar, using two pieces ⅛ x 1⅝ x 21¼ long (taper at ends) medium hard balsa, jointed at the center with a piece of ⅛ plywood overlapping center joint 6" on each side. Cut out center of spar for bellcrank movement, install bellcrank plate, double cementing all contact points as well. Cement a small ¼ balsa block under bellcrank plate for extra strength. Cut to size a medium hard piece of balsa ½ x ½ x 21¼ for the leading edge; also a piece ⅛ x ¾ x 21-5/16 for the trailing edge. Rough shape pieces to form a wedge. Now mark off leading and trailing edges of the Styrofoam. Cut Styrofoam edges off. Now cut wing where spar is to go, lay Styrofoam against spar, and cut-out where bellcrank is to allow room for movement. Now cement Styrofoam (front and back pieces) to wing spar, also cement leading and trailing edges in prope place.

Square off wing tips and cement a piece of medium hard balsa ¾ x ⅜ x 7" roughly shaped to wing tips. At center joints of leading and trailing edges, cement a small cross block of hard balsa, bind all pieces together with masking tape, and let set overnight. Layout wing slots as per plan and cut them into top of wing, then cover slot with Styrofoam sliced 1/16 wider than wing slots. Suggest, while cementing in top of slot, you lay a piece of ⅛ wire in wing slot; this will keep a ⅛ hole open for the lead in wires. The ⅛ wire can be removed as soon as the cement starts to set in 5-10 minutes.

Layout fuselage as shown on profile drawing, using a piece of medium hard balsa 3/16 x 5¾ x 26". On original crutch, I used lightening holes (note picture). Because of the extra hard balsa used in this plane, lightening holes are not recommended when using 3/16 thick balsa.

Mark off on each side of crutch where Number 2 former is to go (4⅞" back from firewall) cutout wing slot as per plan, also cutout where third line bellcrank (quadrant) is to go. Scribe a 1½" circle where arrester-hook hinge is to go. Cut out front half only, leaving the back part for a stop when hook is in lowered position. Make up the three formers (tail piece, Number 2 former—which is cut in half—and the solid firewall). Double-cement

these formers in place. Make up two 2" disks out of 1/16 plywood for hinge cover; advise using 1/16 spacers between this cover and crutch to give about [illegible]" wide slot. This is enough room to make two turns on the [illegible] hook wire, leaving the short end [illegible]" long. This will butt against crutch stop when in proper lowered position (prevents hook from swinging too far forward).

Make up third line bellcrank mount out of [illegible] plywood cemented in place. Also cement [illegible]" block under plate for extra strength. Use a small Perfect bellcrank cut to shape as shown. Drill a 1/16 hole in Number 2 former and firewall 1[illegible] from center line and [illegible]" below motor mount. Cement a [illegible]" long brass tube for flap control wire to travel in, using a piece of 1/16 steel wire 5" long at front end for spring pressure control. Spring should be made up of .015 wire, open wound 2[illegible]" long before contracting. Drill a 1/16 hole 1[illegible]" from center line (Number 2 former and firewall), [illegible]" from bottom of motor mount (right side). Cement in a piece of brass tubing [illegible]" long in which the motor control rod (1/16 wire) travels. Check plans closely here. Cut tail section of crutch where stabilizer is to go. Be sure you cut this parallel to thrust line.

Cement a [illegible] x 1[illegible] x [illegible] x 3" wedge shape platform on crutch. Cement in place [illegible] x [illegible] x 9[illegible]" hard (straight grained) maple motor mounts. Drill [illegible] holes for landing gear. Cut away crutch from top down to bottom line of motor mounts (between Number 2 former and firewall). Install landing gear made up from 5/32 steel wire. Make up fuel tank from tin stock (.010 thick) 4[illegible] x 2[illegible] x 1[illegible] wide. This will hold about 5 ounces of fuel. Cement tank in between motor mounts. Because top of the tank is one inch higher (for perfect engine run) do not put fuel into tank until ready to take off as some fuel may drain into the venturi. The exhaust stack valve is made up from [illegible] x 2[illegible] long brass rod; one end is turned to 3/32 x [illegible] long, the other end to be 3/32 x 1" long. File on each side of rod till you have a [illegible] thick flat surface, this to be snug fit in exhaust stack. Also file away center part so valve will have clearance to turn. Make up side brackets out of [illegible] thick aluminum, using 4-40 bolts to hold in place. Control arm is also made of solid aluminum, [illegible] thick. Drill and tap a 4-40 hole directly over end of exhaust. This is for set screw to keep control arm in proper position. The venturi is made out of 1/16 brass wrapped around end of rod and locked in place with a 4-40 bolt. This venturi flap is closed when exhaust valve is closed, thus, when engine is running at slow speed for any length of time, the motor will not lose suction. The fuel will be right there when needed to pull out of the tight spots some of these carrier planes seem to get into.

Place motor in proper place (4-40 bolts), now install lower control quadrant and install spring to hold exhaust valve in open position. To overcome heavy air drag on third line, I suggest trying a piece of thread (light), tied from wing eyelet to wire clip; this will hold valve in open position until the first pull on the third line, which will automatically break thread.

Let's go back and finish covering the wing. Finish shaping and sanding with fine sandpaper then smear glue on wood. Cover with 1/32 (or 1/16) balsa sheeting. Let this set while making up rear stabilizer elevator, and rudder. Take measurements off plans. Install stabilizer and elevator as shown, using a 1/16 wire for the pushrod. Gouge out the tail block for the rudder post ([illegible] sq.), to be inserted down one inch from the top. Now cement the tail block

to tail former. Drill hole for brass tubing that hook release wire travels through; also cut out tail block where tail wheel plate goes. Cut a 3¾ piece of 1/16 wire, cementing 1¾ of it to rear of rudder, and then wrap nylon over wire. Double cement it. The balance of the wire hangs down and rests against the release wire.

Now finish sanding main wing and install. Connect pushrods for hook and elevator—hook to drop on full down elevator. Use a 1/32 flexible wire to connect arrester hook to flaps, also spring control on flaps. Cement ⅛ balsa planking to the front section from Number 2 former to the firewall. Cut and fit two Styrofoam side pieces. Before you cement in place, be sure all controls work perfectly, also that hinge pin is double cemented so it won't slide out. Cement Styrofoam side pieces in place, using masking tape to hold together while cement dries. When dry, sand to final shape, then cover with 1/32 balsa. Smear the cement over entire under surface of the wood, also wrap this with masking tape till dry. Then give fuselage two coats of clear dope. Lightly sand this off, then cover with Silkspan. Cut and shape the Berkeley canopy and fit cowling in place when ready.

I've shown one type of plane that Styrofoam is used on. Since December, 1954, I have experimented with various types of dopes, cements and glues. Also the wood covering (skin) as compared to the other finishes, such as paper, nylon and plain. These end up being heavier than the wood covering, because of the large amount of filler necessary to fill in the Styrofoam pores. With the wood covering, the finished product is ten times stronger, as well as a much harder surface for compounding to get that high luster finish. My model was finished with two coats of clear dope, lightly sanded with fine paper; followed by three coats of Testor Sanding Sealer, each sanded with Number 300 grit; topped off by three coats of Testor's colored Butyrate dope.

For the sake of comparison, I made up a wing, same size as these plans, using the conventional rib and spar construction. Planked with 1/16 balsa, it was found that the Styrofoam wing was actually one ounce lighter than the conventional wing. Although there is no grain, or splitting, to worry about when using Styrofoam, raw-stage Styrofoam dents easily—so handle it lightly. I, myself, have had no contest carrier experience but on many occasions have done 90 to 95 mph over seven laps from take-off, then slowed down to below 20 mph. You carrier experts should really get results from this swell flying machine.

Below is a list of cements and glues that can be used on Styrofoam. Your local hardware store, or lumber yard, should have one or more of the brands listed below.

SPECIAL SUPPLIERS

Flintkote #740: The Flintkote Co., Whippany, N. J.

Polybond Q-70: Polymer Industries, Inc., Astoria, N. Y.

Styrofoam Adhesive: Floralfoam Products, Midland, Mich.

Weldwood Prest-Set Glue: U. S. Plywood Corp., 55 West 44 St., New York 18, N. Y.

Rez-N-Glue: Schwartz Chemical Co., 136 West 79 St., New York, N. Y.

Elmer's Glue All: The Borden Co., 350 Madison Ave., New York 17, N. Y.

Styrobond Adhesive: Narmco Resin & Coatings Co., Costa Mesa, Calif.

These Blankety Blank Dethermalizers

(*Continued from page* 21)

protrudes above or below the wing a short distance out from the fuselage and which "spoils" the flow of air over the airfoil, destroying the lift of that section and acting as a brake by increasing drag. They act perfectly on full-scale gliders, but make very pood dethermalizers for models.

A spoiler scaled in proportion to a full-sized glider is practically ineffective on a model. To be effective, the spoiler must be made very large indeed. This results in construction problems which are difficult to solve, and mechanical problems of tripping the apparatus that are too complicated to be reliable.

Spoilers of equal area must be built into each side of the wing, otherwise a spiral dive will result that will wreck a gas model. If the spoiler on one side of the wing sticks or doesn't open quite as far as the one on the other side of the wing, a bad spiral dive might result. Although spoilers can be made to work, there are more reliable and simpler devices which give far safer and better results.

An idea which resulted from the wing spoiler system was the spoiler on the fuselage. This consisted merely of a large flap or door which opened outward from the fuselage. This placement of a spoiler, of course, did nothing to decrease the lift of the wing and was therefore less effective than the wing spoiler. It did have the advantage of being easier to build and far simpler in its tripping mechanism. It works in very small thermals, but when a big one comes along and there is really a need for a dethermalizer, a fuselage spoiler is ineffectual.

Shifting the center of gravity towards the rear of the ship so that the airplane would stall out of a thermal was another idea. A lead weight was housed in a small compartment in the bottom of the nose of the ship. A string was fastened to the weight and to the tail of the ship. When the door of the compartment was opened, the weight would fall out and hang to the tail resulting in a considerable movement of the center of gravity.

My experiments with this method of dethermalizing were made on a towline glider. At first, I thought that the idea was going to work, for the resulting stall brought the ship down in a hurry when no thermals were involved. A violent stall might result in considerable damage to a gas job, but at that time I thought if it worked, it would be worth the risk. One discouraging characteristic of this type

was the fact that the weight hanging on the string had the bad habit of swinging through the tail and wing surfaces, making numerous holes before the ship got to earth, but even this might be excused if the ship would only come down. However, the first time the towline job hit a thermal and the DT worked, it stalled merrily but continued to rise in the thermal and was lost. A few more experiments proved that the shifting of the center of gravity was not the DT idea to work on.

An article was written in one of the magazines which described a DT that looked like the final solution. This was the infamous spool-of-thread idea, and caused many fliers to curse the theorists who write articles before testing their ideas.

This DT consisted of a spool of thread which was housed in a compartment in the fuselage. The end of the thread was fastened to a wing tip. When the spool was released, it would hang far below the ship on one wing tip. The weight on the wing tip would cause the ship to spin. But, when the airplane got close to the ground, the spool would rest on the earth taking the weight off the wing tip and the ship would level off and make a perfect landing.

The theory sounded so good, that a whole gang of us equipped our ships with them. We had some trouble with the thread unwinding and getting messed up in things, but this was a small matter that would be worked out later.

The first time one of these DT's worked was on a perfectly windless day. The seven-foot job was directly over-head and almost out of sight when it started its spin. Everything worked perfectly except for one small detail. The ship spun so fast that the spool of thread was streaming out behind the ship. The airplane hit the ground before the spool of thread, and with such speed that it was smashed to bits.

A conference amongst the fellows who had equipped their models with the spool-of-thread DT led to the conclusion that we had made a mistake in fastening the thread to the wing tip on the inside of the turn. Everybody switched their threads to the wing tip on the outside of the turn. The same disastrous results demolished another good airplane.

We fastened the thread to the stabilizer tip on the inside of the turn. Another airplane was smashed. One of the fellows was brave enough to try it on the stabilizer tip on the outside of the turn. When it finally worked, the ship went from a nice right turn in the glide to a perfect left turn. It sailed away on the thermal and was never recovered.

Mechanisms to flip the rudder over and cause a spiral dive work fine on light ships such as towline gliders or some rubber jobs where the ships are so light that the rate of descent is slow and the ship is not damaged on contact. But, on heavier airplanes, and especially gas jobs, the descent is too fast, and a violent contact with the ground results in considerable damage. Besides, rudder adjustments are extremely critical during the fast climb of a high-performance gas job, and I feel that the rudder should be solidly fixed at all times to avoid trouble.

In considering any DT, the possibility of its working during the time of the engine run must be taken into account. If a DT that moved the rudder happened to work during the time that the engine was running, the results would be so disastrous

to a gas job that this type of dethermalizer should never be used.

Another involving the rudder which was reported to have been successfully used was one which increased the size of the vertical fin many times. This was accomplished by having several flat surfaces, which folded down into the stabilizer, pop up to form rudder area when released. The idea as explained by the originator was that this tremendous increase in vertical fin area would have a weather vane effect on the model. It would cause the ship to turn into the wind and glide in a straight line back toward the field.

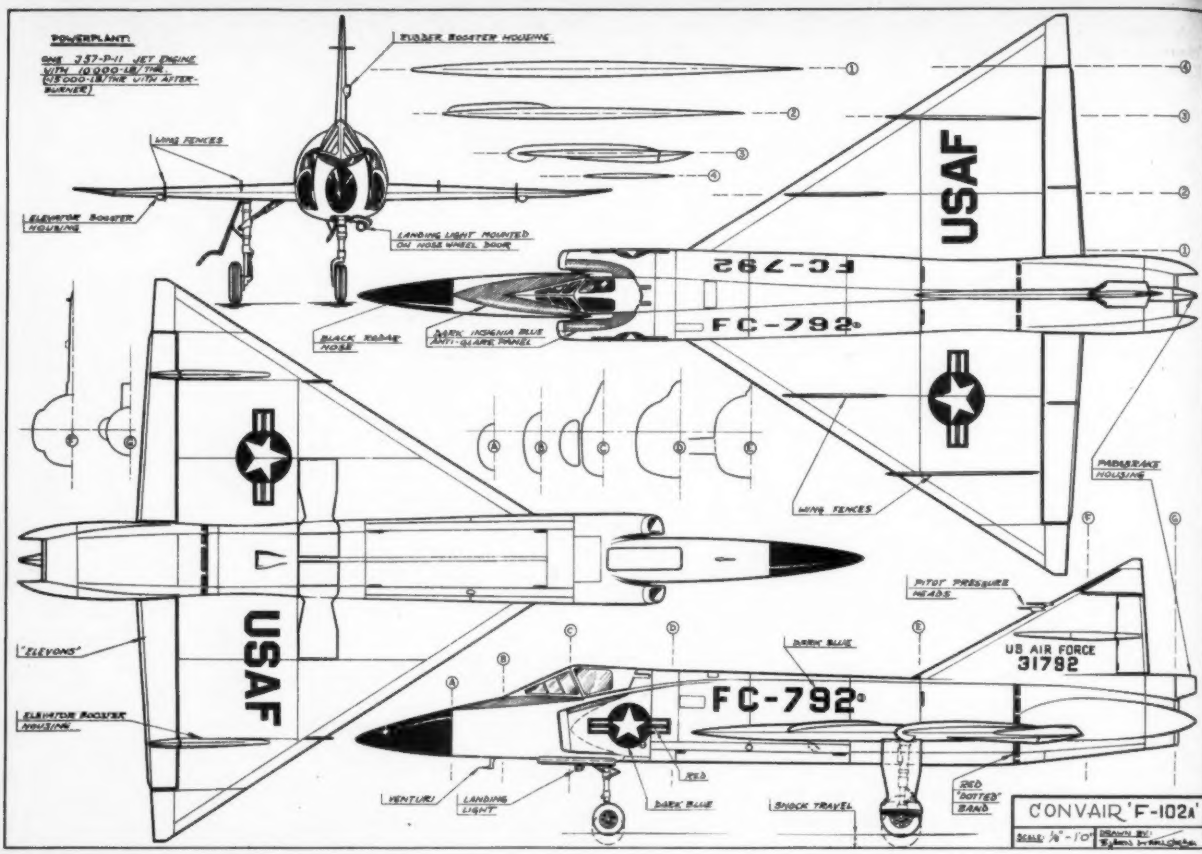
I never experimented with this DT for two reasons. In the first place, as explained above, I do not like to meddle with the rudder on a fast gas job. In the second place, to expect the ship to turn into the wind and glide in a straight line against the wind is expecting a little too much. The ship might glide in a straight line alright, but it is just as likely to glide straight down-wind, or cross-wind, as upwind. An airplane gliding in a wind acts exactly like a boat floating in a river, and who would expect a boat in a river to turn and head up-stream just because it had an overly large rudder?

The dethermalizing experiments described so far make the picture look rather bleak. But, there are two types of DT's which have proven very successful. These are the pop-up tail and the parachute. Each has its advantages. Fliers who have used both sometimes prefer one and sometimes prefer the other. Neither type will generally smash up the airplane if it happens to work during the climb.

The parachute type has the advantage of being entirely separate from the airplane. It is not an integral part of the ship and therefore cannot interfere with the delicate adjustments of it. Where a weak part might result near the tail of the model if a removable stablizer were used, the 'chute has the additional advantage of assuring a stronger fuselage. Furthermore, the releasing mechanism can be made very simple and in such a way that it does not put a strain on the timer. That in itself is an important consideration as any strain or tension on pneumatic timers will cause them to stick or act erratically.

My own chute is 11⅞ inches in diameter with a 3⅜ inch hole in the center. Probably a 'chute of smaller diameter without the hole in the middle would work equally as well if it contained the same total area. But, when I first made a 'chute for this purpose, it was too large. Rather than make a series of new 'chutes of smaller areas, I cut a hole in the middle and made the hole larger and larger until I had the correct area to do the job. Since then, I have made all my 'chutes from this pattern because I know that it is right. I have used it on small class A and large class C jobs without changing its area. The proper area for a particular airplane seems to depend more on the design and adjustments of the particular ship rather than its size, but each flier will have to experiment to determine the correct size for his ship. If the 'chute is too small, it will not bring the airplane down. If it is too large, it will throw the airplane into a violent spin.

The 'chute must be made of high quality silk in order to assure its opening. Silk used in covering models is too light. The silk of a magician's handkerchief is perfect. (And, perhaps, appropriate—Editor) For the sake of peace, I do not recom-



mend the use of a piece of silk from the fair wife's scanties.

It can be made of a single flat piece. First, cut a 12 inch square, then cut off each corner to form an eight-sided figure with each side of equal length. A ¼ inch tuck on each side brings the diameter down to about 11½ inches. The hole is cut in the middle and basted so that the material will not unravel. Eight shroud lines of strong thread, or string, about three feet long, are fastened on to each corner. The shrouds are fastened to a strong piece of fish line another 3 feet long. A four-sided 'chute will tangle and refuse to open. More than eight sides with eight shroud lines is not necessary. Figure 1 shows a properly designed 'chute.

The string is fastened to the tail of the ship, and the 'chute is rolled into a compact pack and tucked into a compartment in the bottom of the fuselage. Figure 2 shows an excellent set-up for a 'chute DT.

When the timer releases the 'chute, it trails behind the ship, causing excessive drag. This tends to straighten out the turn of the airplane so that it will glide out of the thermal area. It will also slow down the airplane so that the wing loses lift, and if the 'chute is sufficiently large, the airplane might go into a spin for a couple of revolutions.

For some reason or other, this type of DT seems to be more severe when the ship is riding a thermal than when it is gliding naturally, which is quite a blessing in itself.

The pop-up stabilizer is another very excellent DT that is being used successfully. The graceful way that it brings the airplane straight down makes it a favorite for many modelers. Although it must be designed so as to put a favorable leverage on the timer, once its mechanical difficulties are worked out, it is a highly successful system.

With this DT, the trailing edge of the stablizer is made to raise up while the leading edge remains in place. Thus, a very high angle of incidence between the wing and the stabilizer results. The wing and stabilizer both stall, and the whole ship sinks to earth like a parachute.

Neither a hinge at the front of the stabilizer nor a spring or extra rubber band to raise the trailing edge are necessary on a properly designed pop-up. The front peg for the hold-down rubber must be placed far enough forward and below the stabilizer platform to insure enough forward and downward pressure on the stab, to keep it in place in both up and down positions. And, the shoulder against which the leading edge of the stab presses must be wide enough to prevent the stabilizer from cocking in the up position. A metal hinge makes too rigid a connection and will not hold up for any time at all, especially on a large airplane.

Keys should be used to assure the correct alinement of the stabilizer in both its down and up positions. The biggest problem is to design a tripping mechanism with a favorable leverage to take the load off the timer.

A stop is used to insure the correct angle of pop-up. This is somewhere in the neighborhood of 40 degrees. Too small an angle will cause violent spins while too large an angle will cause a very high velocity of decent. A string fastened between the fuselage and the stabilizer is the simplest method of insuring the proper angle of pop-up. Figure 3 shows a well designed pop-up with all difficult problems completely solved.

A choice between the pop-up and the 'chute is entirely up to the individual flier. Each method works well and there are arguments for and against each. In either case the problem of a fool-proof, accurate tripping mechanism is the stumbling block for most builders. For this reason, the simple fuse-type timer has become very popular in most parts of the country. However, in this area the farmers are so afraid of fire that they will not allow the use of fuse-type DT's on their fields. As a result, the Northern California Free Flight Association has put a strict ban on fuses.

A safer "fuse" can be made from dry ice. A plug is cut from this material and fastened to the ship. The string attached to the releasing mechanism is looped around this plug. When the plug melts, the string releases the DT. Dry ice melts at a fairly constant rate just as a fuse burns at a fairly constant rate. The size of the plug of dry ice determines the time for dethermalizing.

In my opinion the fuse-type DT is not the ultimate solution. Once a good leverage system using a mechanical timer is built into the ship, it is far more convenient to use than the fuse type. Figures 2 and 3 show two systems that are practically fool proof. The hardware, except for the timer, for these systems must be built by the modeler. However, John Tatone of San Francisco, a noted modeler of many years experience, is producing for the local fliers all the parts for another leverage system patterned after a mousetrap. It can be used with any timer such as the Austin, Hillcrest, or Elmic. He is also about ready to produce a 6 minute clockwork timer to work with his mousetrap releasing mechanism. This timer can be accurately set for any time up to 6 minutes by a mere twist of a pointer. It weighs only ⅛ ounce and is absolutely infallible.

THEORY AND STUNT

(*Continued from page* 27)

shape can be made to do more work per unit area by increasing the chord of the wing or the airspeed." But it takes large changes to produce much increase in efficiency. For general use maximum lift coefficients will be as given in the illustrations.

All symmetrical airfoils, at low angles of attack, will develop a Cl of approximately .1 for every degree angle of attack, hereafter called AOA. What's Cl? It is a number used to define the lift capabilities of a particular airfoil at a given AOA and varies with Reynolds Number. For this lift equation see Equation 2.

Thus by knowing all but one of the components of this equation we can readily find the unknown.

Let's look at our model in level flight. Lift must just equal weight so let's see what AOA we need.

$32 = .000132\ (432)\ (88)^2\ (Cl)$ 60 MPH $= 88$ ft/sec or $Cl = .065$. So our AOA will be .65 degree. At slower speed it will be more and at higher speed less. To estimate landing and take off speeds use a Cl of .8. This will give fairly close results, since accurate information is difficult to obtain when airspeed is not known. Our model would land at about 26 MPH. Take off could be slower due to propellor blast over part of the wing.

The main calculation we are interested in is the looping radius of our ship. We are required to turn smooth loops under 45 degrees. On any length line we can calculate our required radius from Equation 3.

With longer lines we have more room

for turning. To calculate the minimum turn radius for our ship we will equate the maximum lift with the centrifugal force. Actually this is not exact, but for our purposes will do. (See Equation 4)

Here we come across something interesting. Notice V^2 in both ends of our equation. This says the loop radius does not depend on velocity. In fact, this is true for small differences in speed, but remember our speed determined our Reynolds number, which in turn defines our Cl max. However, it has been found that dropping V^2 gives effective results so we won't bother with it. Just don't lose sight of this point. See Equation 5.

To see how tight our ship will turn with a 12% airfoil, see the illustrations.

This is under our minimum for 60 ft. lines so our ship would be alright for the loops. With an 18% wing we can cut the radius to 16.2 feet and with flaps she comes down to 11 feet. All this by changing our Cl. It should be noted here that thicker airfoils are capable of flying at higher angles of attack, hence developing more maximum lift, but that they stall more abruptly. The 18% section works like mad, but will suddenly fall out from under you. The thinner wings stall gradually and consequently make smoother landings. We will find that a 15% airfoil with flap is our ideal setup.

Our radius with flap was 11 feet meaning a 22 ft. diameter loop. How about these 10 foot loops and smaller? We have a pretty good airplane for a sample. The small-diameter loop is possible and has been performed many times, by the author and others, but it is not a loop in the sense that it is at a greatly decreased airspeed. We prefer to call this maneuver a somersault since it depends on a large increase in drag and then tumbling the airplane about its wing. A loop is performed with little noticeable decrease in airspeed, although we know there must be some, since drag increases as we increase our AOA. We normally compensate for this by setting the engine rich in level flight and allowing it to peak during a maneuver. Since we are interested in the 5-foot radius let's work our equation using a 2 lb. airplane, Cl of 1.6 and determine what area we need (See illustrations). A in the formula equals 950 sq. in. which is more than twice the size of our wing. To build a ship this size to a 2 lb. weight is a real challenge. Also this size airplane would probably need a larger engine, would get heavier and larger and heavier and up we go. It might be possible with a .59 engine and a 3¾ lb. airplane. Area would be 1600 sq. in. Quite a beast.

The 5-foot radius is important to us on the square turns. And strangely enough people turn them every day. How? On the slow (60 MPH) airplane our theory is this. With the sharp application of control the plane noses up sharply and slows down at least 20 MPH. The wing becomes stalled, but remember that it will still develop maximum lift. The wing acts as a blanket to kill horizontal motion and generate additional lift due to flat plate area moved against the wind. The ship partly skids around the turn. The lighter they are, the better they look doing this. As control is returned to neutral, the thrust is able to take over and literally haul the ship around on its bootstraps. We will show

later how to trim the ship for best square turns. With the fast airplane the small radius is largely an illusion caused by the rapid change of direction. This has been observed in careful study of the Half Fast in flight. Flaps help by increasing lift and drag during the turn. The 5-foot radius turn, while not being a constant-speed maneuver, is an actuality for most normal stunt ships.

It has been stated that the symmetrical airfoil develops a Cl of .1 per degree AOA. It follows that at zero degrees no lift is developed. This is quite correct and causes some headaches, mostly with airplanes flying around 85 to 100 MPH, particularly the all wing type. It shows up in a hunting action while you are forcing the ship to fly low, around 4 feet. Hunting consists of the ship alternately climbing and diving, both very slightly, usually twice per lap, but sometimes faster. The condition occurs because at high speed the wing must be held at a very small AOA, say one quarter degree or less. At higher altitudes the wing must lift more, due to its tilted or banked condition and the line weight. In level flight a minimum AOA occurs since minimum lift is needed. The difference between zero and our shallow angle is quite small and at times we actually get zero lift. The model drops, but the motion of the air is then such that it develops a positive AOA and climbs slightly. There is a visible lag involved which gives us our hunting. Actually, the wing cannot find the right AOA to support the ship. Solutions for hunting are several. Slow down, increase the weight, sharpen the leading edge radius slightly, add roughness to the leading edge to create some turbulence (not in Combat however), or balance the ship more nose heavy. The latter two solutions aren't necessarily desirable since one is illegal (in combat) and the last will make the ship sluggish. This is an argument for the slow stunt ship. With a hot combat wing some hunting can be tolerated in order to cram the last few ounces of lift in a turn. In stunt however, a great deal of time is spent at four feet so the problem must be considered. It should be stated here that for two airfoils of like thickness, one with a smaller leading edge radius will stall at a lower angle than one with the larger radius. Hence, more lift for looping.

Be back next month with dope on Flaps, CG, tug and other matters.

The Smog Hog

(*Continued from page* 20)

right side of the fuselage just behind the receiver box and operates the throttle via a 1/16" wire push rod. The rubber for the engine control is wound by a removable plug on the bottom of the fuselage.

WING—The wing construction is conventional with a few new wrinkles. The absence of heavy plywood dihedral braces may shock some of the old hands. However, there is a good reason. This is a case of when absence makes the wing grow stronger. The addition of plywood braces will cause stresses to center where the plywood ends, and could cause the wing to fold during a pull-out. Center section strength is achieved by scarf splicing the ¼" square spars, leading and trailing edges. The top and bottom pieces of the front and rear spars should be spliced in opposite directions. The leading and trailing edges should also be spliced opposite. This, with the spar webbing and 1/16" sheeting on the top and bottom of the center section, will result in a center section just as strong (or stronger) and

lighter than one built with plywood dihedral braces. The reenforcing wires on the leading and trailing edges prevent the hold down rubber bands from cutting into them in the advent of a bad landing.

The leading and trailing edges are unique in that they were designed to be cut on a table saw and thereby saving the cost of pre-shaped parts. The plans give the angles and sizes to cut the stock to. Only the leading edge will require final shaping after leading edge sheeting is in place. The wing ribs, being all the same, are mass produced by first cutting blanks of sheet balsa, then stack and shape to final outline. The solid balsa tip is left solid for durability and also it helps to keep the weight high up where it should be. If desired, a conventional shaped trailing edge can be used by notching the trailing edge at each rib station and changing the rib trailing edges to fit. However, you may get the pucker that is so prevalent in most wings where the ribs meet the trailing edge in a but or slotted joint. Building the wing shorter, as indicated by the dashed tip outlines, will increase the flying speed of the model a bit but won't change the flight characteristics noticeably. Cover the wing with nylon for durability and strength. Check for warps before covering, because it is next to impossible to remove them once the wing is covered. Remember, covering will hide a lot of things, but not a crooked wing.

STABILIZER AND ELEVATOR.—Simplicity and ruggedness are the keynotes in the stab construction. Basically, it is a flat ⅜" thick stab with spars added to the top and bottom for strength. The ribs are formed simply by adding rectangular pieces from the spars to the leading and trailing edges on both the top and bottom. These are sanded to a triangular shape when dry. The finished product is a strong symmetrical stabilizer section. The top of the stab should be built complete and allowed to dry before removing from the plan to finish the other side. Sand to the shape indicated on the plans, cover with nylon and dope. The conventional slab-type elevators are connected together by a music-wire connector which has a brass control horn soldered to it. Lace the elevator to the stab with heavy thread at the points shown on the plans. Follow a figure "8" pattern.

FIN AND RUDDER.—There is nothing unusual about the fin and rudder construction. Sand to shape after gluing dorsal fin in place. Glue fillet blocks in place after shaping and make sure there is no off-set in the fin. Add control horn to rudder and lace to fin in figure "8" stitch.

FINAL ASSEMBLY.—Install radio receiver, servos and batteries according to the manufacturer's instructions. Solder all connections well, using rosin core solder and plenty of heat. (A cold iron will require that the iron be left on the joint longer, thereby heating up the components.) To get a good solder joint, clean all areas to be soldered. A cold solder joint is a weak joint, and may come loose under vibration. If a pair of needle-nose pliers are used between the soldered joint and the part to be soldered, the excess heat will be pulled off before it can damage anything.

After equipment is installed and operating, aline the wing and tail on the fuselage and strap it down with rubber bands. Put model on the floor and block up the tail until the stabilizer is parallel to the floor. Measure the distance from the center of the wing leading edge and trailing edge to the floor. The center of the leading edge should be 7/16" higher than

the trailing edge. Shim leading edge or trailing edge as necessary. After checking this important measurement, check for proper location of the center of gravity.

FLIGHT TESTING.—Before leaving for the flying field, be sure your name, address, and phone number is inside and also outside in some obvious place. Don't forget, the fuselage is the most valuable component. Wings can be left up in a tree with the fuselage going all the way to the ground.

Bonner's method of flight testing is a very practical and safe way to make the first flight on any R/C model with engine control. There is no test gliding, which is impractical for any model of this size anyway, unless you are long legged and have a good set of lungs. This model has a respectable glide speed and would require a healthy shove to get flying speed.

Check the radio operation with the engine running and the model suspended off the ground by two rubber loops, one near each wing tip held by a couple helpers. This will approximate the vibration that will occur in flight. Check all controls. If all's well, you are ready for the first flight. Put only enough fuel in the tank for about 30 seconds engine run. Do not fill the tank completely, because a full tank coupled with a flyaway can result in a lost model. The first flight should be an ROG with the engine running at about ¾ speed. This way, low speed will keep the model on the ground or stop it completely. Radio On. Head model into the wind and release. If you lose control during the take-off run (the model doesn't appear to be going to take-off), drop engine into low speed and taxi model back. Increase incidence of the wing and try it again. It should take-off with this ¾ power.

After the model is airborne, get altitude, don't try any maneuvers on this first flight but just concentrate on any adjustments that will be needed to give a straight smooth flight.

When the model is flying just the way you want it, fill the tank, start the engine and peak it out, *switch the radio ON*, taxi down wind and swing around into the wind. Pulse for high speed and you are in the air with one of the sweetest flying R/C models in the air today. You can go through a complete stunt pattern, shoot touch-and-go landings, then make a low speed engine approach, land and taxi back to your tool kit. You will enjoy the ground handling characteristics of this model as well as the maneuvers it will perform in the air. Remember, it will take practice to perform all maneuvers perfectly, but that is what it takes to win contests. See you in the winner's circle.

Foreign Notes

(*Continued from page 37*)

only 1.65 oz. rubber, turned in initial flights of 2:28, 2:50 and 2:53 on 60, 68 and 70 percent turns, respectively, indicating an easy 3:00 max on full turns. Model is powered by 12 strands Pirelli rubber, made up to 22 in. length but stretched 24 in. between hooks, the tight setup giving a smoother and more complete run-out with, of course no risk of bunching. Turning an 18 in. double-folder, this gives a motor run of 45-50 sec. on max safe turns. Model itself is fairly conventional, with 41 in. polyhedral wing and a 34% stab. Climb is slow but steady up to 150-200 ft.

New Italian Challenger

Surprise item at the World Speed Championships was the Italian, Cellini's

third place with a .15 cu. in. Barbini B.40 glowplug motor. Clocking 124.3 mph to beat the Super-Tigres of the rest of the Italian team, Cellini's performance has created a great deal of interest in this new Italian motor.

It so happens that we have lately been testing a B.40 Glow which was submitted to us by the distributors, Solaria of Milan, some months ago. The engine is a development of the B.40 Diesel introduced nearly two years ago. It is a shaft valve motor having a reverse-flow scavenged cylinder in which two opposed exhaust ports are matched by two opposed and inclined bypass ports. The shaft runs in a roller type inner bearing, supplemented by a ball journal outer bearing.

In stock trim the output was .27/.28 bhp running on a nitro fuel and following a four-hour break-in. Cellini's motor was reworked slightly and had modified intake and bypass porting, lightened piston and conrod and a slightly raised compression.

In Brief . . .

Japan . . . The O.S. people have new tone and multi-channel RC gear under development. May be expected to supplement existing Minitron single-channel equipment in due course.

Germany . . . A swing from Diesel to glowplug is evident in Germany. Both Webra and Star, formerly exclusively Diesel, are now concentrating on glow models. There have been complaints from German dealers about tricky starting with some small diesels.

Poland . . . New .15 motor reported from Poland is ARA-2.5B. Following short-stroke trend of East German Wilo and Hungarian Proton, ARA has bore and stroke of .610 x .512 in. and weighs 4.8 oz.

Cuba . . . The active and enthusiastic Havana group were recently honored with a request for a display by the Big Brass of the Cuban AAF. Two C-47's were placed at the modelers' disposal for transport.

England . . . Congratulations to Capt. Carroll, USAF, who showed the local lads by winning the single-channel RC event at the All-Britain Rally. Claimed to be the biggest one-day event in the world, Rally this year attracted 100 clubs and 14,000 spectators.

Bill Brown's Brainchild

(*Continued from page* 17)

proved D's, had chrome-molybdenum shafts.

After looking at modern motors of all sizes, one's impressions on re-examining the Brown, are of its tall cylinder, short frontal overhang, light weight and, looking inside, the modest dimensions of the stressed components. The Model D weighs 7¼ oz., which is only about half that of the average post-war .60. The crankshaft journal is a mere 5/16 in. in diameter and 1 inch long—a bearing area of 0.9818 sq. in. and, by a coincidence, precisely the same dimensions as that now used by the British Allen-Mercury 10 diesel—a motor of only one-tenth of the Brown's piston displacement. The long, slim conrod (it is some 2 in. between centers) has a shank 1/10 in. thick and ¼ in. wide at the widest point, the crankpin bearing being 3/16 in. dia. by ¼ in. The bronze wrist-pin, which is pressed into deep bosses in the piston, is only ⅛ in. diameter.

The engine is of the 3-port two-cycle type, the induction and exhaust ports being at the back of the cylinder while the bypass is at the front. The exhaust ports are in the form of four holes, 5/32 in.

(*Continued on page* 60)

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across, and occupying about 90 degrees of the cylinder circumference. Below them are four similar ports through which the intake is effected from a 1¼ in. bore induction pipe. Another set of four ports in the front wall of the bore comprise the bypass intake ports. Discharge from crankcase to bypass passage is effected through two piston skirt ports 17/64 in. in diameter which register with two similar ports in the lower part of the bore.

Twenty years ago, the average model aircraft engine was operated at speeds of between one-third and one-half those common today. Four to five thousand rpm, using 14 in., 15 in. or even 16 in. diameter props, were usual with a Brown. With the types of models then being built, of course, there was little demand for high propeller speeds or high power outputs. Most .60 engines were nominally rated as "1/5th horsepower motors." Such an output was generally available at somewhere between 4000 and 5000 rpm. although, in actual fact, a peak power of about ¼ hp. could be obtained in the region of 6000 to 7000 rpm.

This is indicated by our test figures for the Model D, which, it will be observed, actually produced the quite commendable output of 0.258 bhp at 6,200 rpm. This horsepower figure, it will be noted, roughly corresponds with that for a good, modern contest engine of .15 cu.in.—one-quarter of the Brown's displacement—a remarkable commentary on the progress that has been made in model engine development.

We must not lose sight of the fact, however, that the modern engine has to peak at revolutions 2-2½ times as high as the Brown and will probably be using a prop of only 8 in. diameter or less. The Brown, on the other hand, will be delivering its maximum power on a 13-14 in. prop. Prewar gas models were, of course, relatively large, generally spanning (for a Brown) around 7-8 feet and weighing 6 or 7 lbs, and the Brown was certainly far better suited to this type of model than would be a high-speed modern small engine.

Due to their small piston area, model gasoline engines gain little benefit from the anti-knock value of high octane fuels, and plain, unleaded white gasoline is generally to be preferred, especially for low compression engines like the Brown Junior. For our tests, therefore, a 3 to 1 mixture of S.B.P.4 spirit (of approx. 60-62 octane rating), blended with SAE 60, motor 60 oil was chosen.

All Model B Browns and some Model C's, were equipped with a choke device over the carburetor intake. This was not fitted to the Model D and one must resort to the now common finger choking method. The procedure for starting is to open the needle-valve to the approximate setting, retard the ignition, close the air intake and begin flicking the prop. The intake is completely uncovered only when the engine is actually firing. The engine starts quite easily.

There is, of course, a great deal more control over engine speed with a motor of this kind, than with the modern glow and diesel types. Apart from the fact that the engines will run happily while swinging really big props, it is also possible to throttle right down to less than 1200 rpm, still **two-cycling**, by means of the timer advance and retard control, plus slight readjustment of mixture strength.

Another feature of the Brown is, of course, its very modest fuel consumption and relatively clean running, little residual oil being thrown out. One of the troubles that plagued pre-war modelers was the oiling of plugs and points, but this was not experienced during our test of the Brown,

even after protracted low-speed running.

Not many Brown Juniors are still around today and engine collectors hoard them jealously, (we heard of one enthusiast who has fourteen of them). Like the Model T Ford, the Brown Junior remains dear in the memories of old-timers—and with equal justification.

GENERAL DATA

Type: Single-cylinder, air-cooled, spark-ignition, 3-port loop-scavenged two cycle.
Displacement: 0.6013 cu.in.
Bore: 0.875 in. Stroke: 1.00 in.
Compression Ratio: 6.5 : 1
Stroke/Bore Ratio: 1.143 : 1
Weight: 7.25 oz. (bare engine with spark-plug and timer)

TEST DATA

Fuel: 3 parts SBP.4 white gasoline, 1 part SAE 60 mineral-oil.
Ignition: Hurleman ⅜ in. spark-plug. Special 6-volt ignition system. Point gap .010 in.
Maximum Output: 0.258 bhp at 6200 rpm.
Maximum Torque: 0.26 lbs/ft at 3500 rpm.
Maximum BMEP: 32.5 lbs/sq. in. at 3500 rpm.
Maximum revolutions on 16 x 8 prop: 3250 rpm.
Maximum revolutions on 14 x 6 prop: 5400 rpm.
Maximum revolutions on 13 x 6 prop: 6500 rpm.
Minimum steady speed on 16 x 8 prop: 1150 rpm.
Power/Weight Ratio: 57.3 bhp/lb.†
Specific Output: 26.0 bhp/litre.
†(Based on bare engine weight and not including tank, ignition-coil, condenser, battery, wiring, etc.)

Make that Model Fly

(*Continued from page* 29)

bad stall recovery characteristics when it accidentally stalls; a slight stall can build up into repeated, ever increasing, galloping stalls. Taking too much angle out of the wing does the same thing.

Which way to turn? Eventually, the model will have to be so adjusted that it will turn in a big circle while gliding after the propeller stops running, otherwise a mad chase will result on every flight or perhaps the model will be lost. Which way you want the ship to turn, depends mostly on the designer's layout of the model. For example, the lower the wing is positioned on the fuselage, the more pronounced the model will want to turn to the left while the engine is running. It would not be desirable to make the plane turn left in the glide as well for the combination of forces may overwhelm the plane and make it spiral into the ground under power. A high wing location, with a high cabin profile, or a pylon as on contest free-flight models, has an opposite effect, and a righthand glide may not be safe. But why monkey shines?

Well, first, the turning propeller exerts a force called torque (in addition to thrust) which makes the model roll to the left (when viewed from the rear) opposite to the direction of the prop's rotation. But, at the same time, there is a twisting slipstream blowing back from the propeller which strikes against left side of the high fuselage, the pylon and even the vertical tail, making the model roll to the right. So, in some designs, notably low wings, the torque is much greater than the slipstream effect and the ship wants to roll and turn left under power, whereas, in

the pylon type layout, the slipstream may be the more powerful and the model will want to spiral to the right. At a magic point in-between (good for RC) the ship will want to fly straight under power.

It is rather tricky to fully adjust the model for its glide turn, before it makes its first short, low-power flight. Turn adjustments can be made by bending a moveable rudder or rudder tab, or by tilting the stabilizer. Since bending a rudder or tab has great effect on the power flight, too, it is better to tilt the stabilizer, whenever mounting allows this to be done. When viewed from the front of the model, the glide turn will be in the direction of the higher stabilizer tip. Strangely, tilting the stabilizer has small effect on the power flight, so it is a good adjustment to separate the glide adjustments from the power adjustments.

First power flight: For sport and simple models, this should be made at about half power. Run the engine rich. Use a timer to limit the flight to 10 seconds or so. Don't ever fill the tank—in case a timer fails, you don't want to fly-away. Or use a small tank whose duration you know from engine-run tests in advance.

Here's what we are shooting for: though the glide trim may be correct, it is quite probable that the model will stall when the engine runs. It may dive but this is very unlikely. Regardless of what faults the model exhibits under power, never correct them by the same measures used for the glide portion of the tests. If you do so, the glide will be fouled up, and you will have to begin all over again. If the model stalls under power, the engine may be tilted down. The resulting down thrust then tends to hold down the nose.

A mid stalling tendency under power is desirable if the model is flying straight. A mild stall then can be corrected, either in the glide or under power, by making the plane circle or turn. And you want it to turn. If the model does not have a natural power turn you can make the model turn by adding right thrust, or tilting the engine toward the right. The rudder or rudder tab may be offset, for a turn under power, but this can be dangerous as the effect will be increased whenever the plane flies faster. Tremendous down thrust usually is required if the model is to fly straight under power.

Sometimes a rudder or tab adjustment will be safe. If, for example, a model has a pronounced turn tendency under power to begin with, slight opposite rudder will decrease the amount of banking. (Such as left rudder on a right turning pylon, or right rudder on a shoulder or low wing that likes to spiral to the left. But in these cases, the rudder adjustment can be used only up to the point where the glide turn is caused to tighten up. Then thrust line adjustments would be better. Apparently, it is not good to "rudder" the ship into power turns but it is safe to rudder it out of power turns to a limited degree.

On the first few power test hops, we are interested only in getting the model airborne safely and back on the ground without damage. Don't expect to obtain a precise power adjustment right off the bat. This short power hop will provide a chance to observe the glide under better conditions than was possible in hand gliding. You may want to affect further improvements on the glide path, until the plane circles smoothly, not diving or stalling at all, and not gliding on a straight path. Remember that tilting the stab more to increase turn, will take out a mild stall in the glide. Conversely, if the turn is too tight, and the speed too fast, remove some stabilizer tilt to open up the glide circle and to make the plane fly more slowly.

The final touches: Once the glide is perfect, you can concentrate fully on the power portion of the flight, making corrections to the thrust line as necessary to hold down the nose or to compell the plane to circle, more or less, while the engine is running. Trimming the model is a patient step-by-step proceedure. If the power flight is very poor at the beginning, with extreme stalling or turning tendencies, it is obvious that these dangers must be lessened before you can go on polishing the glide adjustments. But as soon as the engine run doesn't threaten disaster, you can go back to flight-by-flight improvements of the glide. Of course, these additional small corrections of the glide will have affects on the power flight, so you will have to continue making fine adjustments to the thrust line to bring the power flight back into line after the glide has been altered.

Finally, when the glide is perfect, and the power flight reasonably safe, you can begin to add more and more power. Once you have a satisfactory propeller, never change diameter or pitch or, for that matter, the brand. Torque and slipstream will be altered and your patiently adjusted ship may crack up. A propeller change calls for new power tests. Further minor adjustments to the thrust line then may become necessary.


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For .09 to .019 Engines — ⅝" Scale — Big 42" Wingspan
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3-4
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(U. S. Navy designation SNJ) Most widely used military training aircraft. More than 10,000 were built in the U. S. and Canada. Used by all the Allied training commands and still widely used today. Powered by a 550 h.p. Pratt & Whitney R-1340 engine. 212 m.p.h.
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7
7
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In July of '44, the 5,936 SBD "Dauntless" rolled off the line, last of a truly great aircraft. Designed in 1939, it was obsolete when Pearl Harbor was attacked. It winged its way across the Pacific and the North African theatre. It has been credited with turning the tide of battle at Midway and the Coral Sea. Its loss ratio was the lowest of all Carrier aircraft in the Pacific theatre. It could withstand terrible punishment and often staggered back on wings shot to pieces. Span was 41'6", speed 253 m.p.h. 1200 horsepower, 1600 lb. bomb load, four machine guns.
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As a flying scale design or Navy Carrier type model plane is a beautiful flyer. Easy to control, resp with excellent take-off and landing qualities. The brakes can be made to operate for landings if desired rigged to open on full-down elevator. With motor added, you can make realistic power-on carrier la
Assembly time is very very low, thanks to the carved hollowed fuselage blocks, the metal ring cowl, canopy and other fabricated parts. You'll be proud


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35" Wingspan
Three place cabin monoplane originally introduced as the "Cruiser" in 1940 with 75 h.p. then as the "Super Cruiser" after World War II, with 104 h.p. and then in 1948 as the four place "Family Cruiser". "Super Cruiser" had a maximum speed of 115 m.p.h.
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This low-wing sport plane turns in long stable flights. The tricycle landing gear adds realism to landings.
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N6595K
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(Not for Rubber Power) 33½" Wingspan
The hull design is perfect for realistic water take-offs.
Three place amphibian with retractable landing gear. Nose wheel protrudes when retracted to serve as a bumper. Powered by 125 h.p. Lycoming. 125 m.p.h.
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$2.50
STINSON VOYAGER "150"
34" Wingspan
Originally built by Stinson division of Consolidated Vultee. Added to the Piper line in 1948. Four place 165 h.p. Franklin engine. 145 m.p.h. maximum speed.
CESSNA "180"
35" Wingspan
$2.95
Four place cabin monoplane introduced in 1953 using the same wing as the "170" but with a re-designed fuselage and tail unit. Powered by a 225 h.p. Continental Engine. Maximum speed is 165 m.p.h.
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US ARMY
01327
CESSNA L-19 "BIRD DOG"
36" Wingspan
Two seat observation plane used on a large scale in Korean War by the U.S. Army and the U.S. Marines. A large number of these are used by National Guard units. Powered by 213 h.p. Continental—130 m.p.h.
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34" Wingspan
Four place light cabin monoplane. Powered by 145 h.p. Continental engine. Speed—129 m.p.h.
Featured as a landplane, plans show pontoon details for those desiring the added thrill of water take-offs. Finished model is really spectacular.
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STINSON SENTINEL "L-5"
33½" Wingspan
Two place liaison and observation plane first flown in 1941. 1731 L-5's were built during World War II. Still in use by the U.S.A.F., Italian Air Force, and the Japanese Air Defense Force. Powered by 190 h.p. Lycoming. Maximum—129 m.p.h.—112 m.p.h. Cruising.
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35" Wingspan
Known as the "Interstate Cadet" before World War II and currently built by Call Aircraft Co. Two place—power was 65 h.p. It is now stepped up to 125 h.p. with an increase in maximum speed to 135 m.p.h.
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If no local dealer is convenient, mail orders will be filled by Berkeley Model Supplies, Dept. MA., West Hempstead, N. Y. Please include 25¢ packing & postage.
FAIRCHILD 24 "RANCHER"
36½" Wingspan
First produced in 1933 as a two-seater, in 1938 was introduced as a four place model using either a radial Warner engine or an in-line Ranger. Military verision was known as the VC-61 "Forwarder" by the U.S.A.F. and the "Argus" by the R.A.F. Production resumed for business use after the war. 132 m.p.h.